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Vol. I CHICAGO, JUNE, 1909 No. 6

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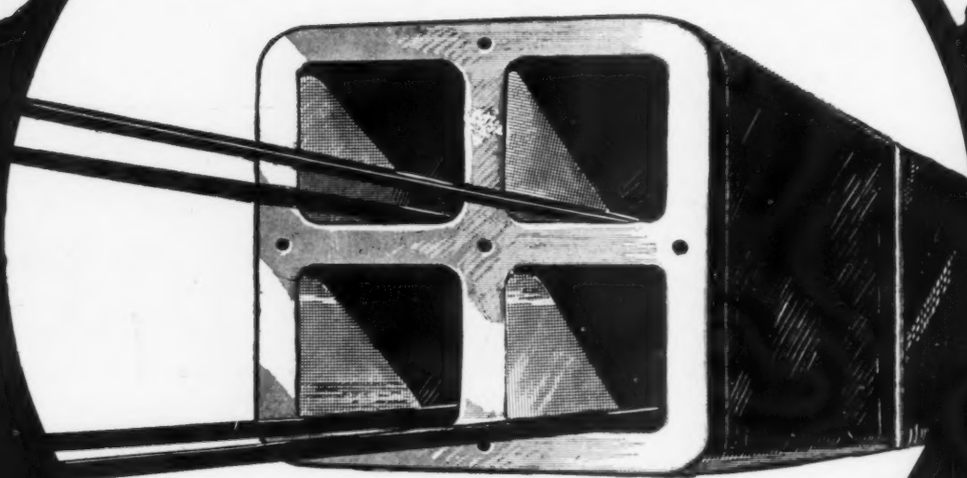

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ADVANTAGES OF STANDARD MANUFACTURE.

WHATEVER the difficulties encountered by operating telephone companies in the endeavor to standardize their equipment may be, there can be little question in the minds of those familiar with modern manufacturing conditions, as to the advantages of thorough standardization to the manufacturer of telephone apparatus.

This is the day of system in everything; and that the development of the systematizing tendency is not one of those business fads which occasionally invade the commercial world, is shown in the already increased quality and quantity of the product affected by it.

In the commercial sense, standardization of manufacture is merely a logical application of system. In connection with the telephone industry it may even be said that the refusal to adopt any standards whatever might be expected to cause the speedy downfall of the unsystematic manufacturer.

The manufacture of complete telephone equipments is, even when reduced to the final degree of standardization, a complex and intricate business, involving the production of a vast number of parts, small and large. The unnecessary multiplication of these parts invites disaster; for the manufacturer who places no voluntary limit upon the diversity of his output along any given line certainly cannot expect such a limit to be reached automatically. In the very nature of the telephone business changes and improvements are constantly suggesting themselves which seem to demand new apparatus to express them.

It is this problem of improvements, which constitutes the life of the telephone business, which appears to offer the greatest obstacle to complete standardization; and it is true that to overcome this obstacle demands an ability of no mean order. Changes and improvements we must have—the problem is to make them conform so far as possible to present manufacture.

The matter resolves itself into one of intelligent design. Naturally, the majority of necessary changes are of a minor character. However, occasionally a distinct innovation is deemed desirable, seeming to call for entirely new construction throughout. In the course of several years the result of such a procedure would mean a startling array of different types of apparatus, all intended to do the same work; none of which could be abandoned because of the demands made upon it from time to time by prior installations.

To those unacquainted with the flexibility of apparatus design, it is surprising what a little serious thought will do toward conforming new construction to old. The most radical of changes can often, indeed generally, be so incorporated into present forms as to leave the shop almost in ignorance of the fact that a change has been made. The manufacture of one or two new piece-parts is inconsiderable where perhaps twenty or more are involved in the one type of apparatus.

It will be seen from this that if intelligent standardization does not necessarily involve the cessation of progress, it cannot, on the other hand, entirely dispense with the production of occasional new parts. But a good designer can reduce even this to a minimum. For example, an entirely new key or jack spring, while requiring a new forming tool, may very likely be made to use a standard blank, doing away with any new blanking die and with an extra stock of blanks. In the purely electrical part of the apparatus there is still greater flexibility. Coils, spools and cores of standard size and construction are adaptable to an infinitely wide range of uses, and the design of new ones for every new piece of apparatus cannot but be expensive, wasteful and cumbersome. There can be little improvement possible in the construction of magnet coils when any intelligent foresight has been used in their original selection and design. And since the mechanical construction of all electrical apparatus is based more or less upon the form of coil used, standardization throughout is assisted by the adoption of standard coil forms.

Granted, then, that the process of standardizing calls for careful consideration at the hands of the designer, let us see what is actually gained to warrant the expenditure of time and the restriction of freedom in design.

The first place to feel the improvement is the toolroom. The use of the same tool for the production of piece-parts for different types of apparatus reduces labor, time and the calculation of material needed to the minimum. The carrying of a large stock of tools for occasional use is obviated; and the capital tied up in such a stock is sometimes considerable.

The stock-room in a telephone factory is at best a complex proposition. The labor of keeping stock, and the liability to error, are multiplied exactly in proportion to the number of parts kept in stock which are not standard. There is no department deserving of greater attention and care than the stock-room; and it is here that standardization brings the greatest benefit.

The various assembling departments gain through the reduction of a diversity of operations, since operations for different types of standard apparatus will be similar, requiring less skill and allowing less time to be spent in changing work.

The work of the cost department, the specification department, and the code department is so simplified as to require far less attention, which means a direct saving in these departments.

The uniform size, mountings, etc., of standard apparatus are not only a source of time saving to the drafting room and the shop, but practically eliminates error in the fitting of cabinet work and the various frames to contain the equipment.

And last in the course of manufacture, but very likely first in the eyes of the office, the finished product presents a uniformity and simplicity which make a powerful appeal to the prospective customer, and affords a strong talking point for the salesman.

In the consideration of standard manufacture, the error most frequently made is that the phrase is construed to mean a restriction of seemingly essential types of product. This is a misconception of the true requirements of manufacture. The problem as applied to the shop involves not so much the reduction of types as of parts. Standard parts solve one of the greatest difficulties of complicated manufacture; and it may be said that when piece-parts are so standardized that they adapt themselves to a variety of apparatus, the completed apparatus will almost take care of itself.

Of course, any system of standardizing which does not recognize the peculiar requirements of operating companies who have not adopted any standards, will necessarily be limited in its scope. Any manufacturer may occasionally be forced to step aside from his line of standards to accommodate the special order, but that this will work any greater hardship upon the standardized factory than upon its opposite cannot be admitted. The most complete standardization possible can never indicate inability to produce non-standard apparatus. Intelligent system only seeks to eliminate the unreasonable and places no limit upon possible production.

With the certain adoption of approved standards by operating companies, the manufacture of standard apparatus will be in a position to do an increased amount of business; while his competitor of the miscellaneous product will find himself with a choice collection of scrap on his hands.

THE LIFE OF GALVANIZED IRON WIRE.

IN the determination of such rates for telephone service as are best calculated to produce fair returns upon the capital invested while maintaining a permanent property, the item of depreciation is one of the most vital. Its importance is in no way decreased by the fact that absolute statistics are lacking, due to the fact that the telephone plant has existed for a period equal to less than two complete cycles of depreciation.

The prevalence of galvanized iron line wire construction makes the life of such installations an important factor in the preparation of even the roughest estimate of plant depreciation. It is obvious that the reconstruction, in two years, of line whose life had been calculated at ten years, places a heavy burden on the depreciation fund.

It is customary for construction men to base their calculations as to the expectation of life of galvanized iron wire on the differences between the three common grades of such wire known as steel, best-best, and extra-best-best. Each kind of wire so designated contains its particular quota of carbon, the resistance to corrosive influences being inversely proportionate to the amount of carbon.

The factor that upsets any estimate of life based on the chemical constituency of the metal is that corrosion comes from the outside, and generally from elements over which the constructor has no control. In fact, Mr. Raymond, in his article on page XXX, shows that the life of wire many vary between the surprising limits of thirty-five years, under the most favorable conditions, and six months, in the most adverse circumstances.

It is shown that the conditions governing the duration of an iron wire line are much more complex than might be imagined. Not only the moisture in the air, but the chemical agents which may be held in solution by the moisture, as salt, sulphuric and nitric acids, etc., have their positive and definite action. Furthermore, the direction of prevailing winds may act in an unexpected manner in bringing these influences to the vicinity of the wire.

Zinc can never, even theoretically, become an absolute protective covering for iron. When the zinc is pure, and the coating homogeneous, it increases the life of the wire in proportion to its resistance to the iron-corroding influences. When a point of iron becomes

exposed, however, the zinc protects it at the sacrifice of its own substance; for the short-circuited electrolytic cell formed consumes zinc to produce local current. It is at once evident that any impurities in the zinc will set up similar local action without equivalent protection to the iron.

The life of the best grade of galvanized iron wire under fairly favorable circumstances is given at about fourteen years. This figure is interesting as being that taken by many telephone engineers as the life of a telephone plant, or the duration of a complete cycle of depreciation.

ENFORCING INTERCONNECTIONS.

IT WAS in July, 1907, that Judge Hunt, of Helena, handed down a decision which said in substance that the operating telephone company was a common carrier—a public service corporation with functions not unlike those of railroads. This meant that a telephone call which originated at a non-Bell or independent exchange must be carried to destination, whether it terminated in a like exchange or not, and vice versa. It was pointed out at the time, should this decision become a law of all the states, that it would upset the traditions of operating practice.

The sweep of Judge Hunt's finding seems to have been confined to Montana. The Bell company opposed the case in that state, because it was stronger than the independents. The independent companies wanted the decision, because they did not care to build the long-distance lines to compete with the Bell, who had already made the investment.

From the viewpoint of the general public the telephone lines were like the railways. They were common carriers enjoying the privileges of and subject to the obligations of such organizations, and therefore bound like the railroad to connect with the competing lines and to carry the business originating on competing lines, or to send over a competing route to a common point business originating on its own lines if the public desired such routing. The public seemed to recognize this similarity. To controvert such opinion the telephone company had to show that its business differed so essentially from the railroad business as to vitiate the analogy, and the telephone company failed to produce evidence which satisfied the court. In Montana the public regarded Judge Hunt's decision as equitable.

But now the scene of enforced interconnection has shifted to Ohio, where the independent companies are strongly entrenched with local systems and long-distance lines.

Judge Tayler of the United States circuit court at Cleveland has handed down an opinion bearing on the subject of unification of telephone service. Judge Tayler's decision is in full accord with a similar decision made in that state by Judge Anderson, a short time previously. The case was brought by the United States Telephone Company to restrain the Central Union Telephone Company from connecting its long-distance circuits with certain independent exchanges in Ohio. Judge Tayler's decision denies the petition of the independent operator.

These more recent complications have grown out of the changed policy of the Bell company, who formerly denied any sort of affiliation with the independents, and who now seeks to connect its lines with its competitors. The United States Telephone Company is an independent long-distance operator, and it enjoyed exclusive contracts with other independent exchange systems in Ohio, much to the chagrin of the Bell company.

Elsewhere in TELEPHONE ENGINEER are given excerpts from Judge Tayler's decision. It will be observed that the judge has something to say about monopolies and that his sense of discrimination finds no consolation or choice between the contending factions.

We are also printing in this issue of TELEPHONE ENGINEER excerpts from Mr. Norton's address before the convention of Indiana independents. Mr. Norton is authority for the statement that there are 435 independent telephone systems in his state, and that nearly 100 of them maintain relations with the Central Union. He pleads for the full co-operation of independent exchanges for the long-distance business where it is possible to handle it over independent long-distance lines. It would seem that Mr. Norton has sounded the keynote for the Ohio independent, who will of necessity be obliged to reckon with the new conditions imposed by Judge Tayler. Independent operators have built a splendid competing system in the Buckeye state and are in every way competent to cope with this change in operating practice as it will affect them.

DISCUSSING THE BUG.

LAST month TELEPHONE ENGINEER printed an editorial under the caption "Extirpate the Bug," which endeavored to point out an inconsistency in the practice of charging for a call put through to a private branch exchange board when the party desired on the branch board was unavailable. It was pointed out that in this case the private branch exchange board formed merely a part of an uncompleted circuit, and in no way constituted the ultimate object of the call. Evidently the position taken in the editorial is not above question.

In the last paragraph of his letter, D. S. H. admits that through supervision is so desirable that a special rate of ten cents per call for calls supervised to party rather than to premises would be welcomed by telephone subscribers; but further points out that the city ordinance in Chicago prohibits such a rate, no matter how desirable.

On the other hand, the letter from Leland Hume expresses an opinion that the feature of through supervision is unnecessary and impractical, and that it would be impossible without considerable engineering and mechanical change.

The private branch exchange switchboard, in the usual method of handling, is peculiar in that it remains always a part of the operating company's plant, although its operating expense is borne directly by the subscriber. If the private branch exchange were strictly the telephone company's board, operator and all, there seems to be little doubt that through supervision would be the regular practice.

To illustrate: There are probably more lines on the Chicago City Hall private branch exchange board than there are entering the Chicago "Longwood" exchange. To get the City Hall only, when desiring to talk with the chief of police, is as valueless as it would be in calling Longwood 401, to get no farther than the Longwood exchange. Yet in the latter case no charge is made; in the former, the full call rate is chalked up.

We invite further discussion on this point.

The Two Competing Systems

By C. S. Norton

THE telephone business today is founded upon two principles as opposed to each other as good and evil, or light and darkness. The one is the principle of independence, where each community owns and operates its telephone system in its own way and has only contract relations with other telephone companies. The other is the principle of monopoly, where all separate exchanges and toll lines are a part of one corporation that outlines the policy of all. These two principles cannot be merged, consolidated nor harmonized and each still be retained as a factor of the combination. The chief purpose of a monopoly is to destroy competition. The chief purpose of independence is to admit competition where necessary. Monopoly takes out of the business in one community, where it has its own way, an excessive earning to hold up a weak plant or fight competition in another community. The independents do not lay tribute upon one community in order to carry on an infamous warfare against competition in another, far removed, but turn back into each its own earnings, believing that every community should bear its own burdens, fight its own battles, or enjoy the usufruct of its own frugality. Monopoly and independence are opposing principles that cannot be harmonized in this generation nor in the generation to come.

We are today face to face with a new condition in telephone practice in this state, a condition which a few years ago no one dreamed we would meet with. Our competitor seems to have realized that it had come to the place where it must either (1st) continue to sink money in operating its property, (2nd) go out of the exchange business, and eventually the local toll line business, or (3rd) join its toll lines with our exchanges and endeavor to save some of its exchanges and all of its toll lines. It has chosen, temporarily at least, the latter proposition, thus embarrassing us by offering to help build up certain of our exchanges rather than buying and burning them as it did a few years ago. How shall we meet this new move on the part of our competitor?

While many of our exchanges have rejected, some have accepted the proposition. While we may not all see alike as to the advisability of thus joining our system with the lines of our competitiors, we do believe that there can be no disagreement upon the proposition that our first duty is to co-operate with our fellow independents. The loyalty in years past of other independents to you who now have dual toll line connections has made it possible for you to drive or keep out a competition that would be demoralizing. Since now you have in your own company all the telephone business of your community, you owe to these same independents that same measure of fealty which they in times past accorded you. We owe the Bell nothing, but we do owe much to one another. So long as the Bell exchanges exist in South Bend, Peru, Terre Haute, Lafayette and Indianapolis, and are in active competition with the independents in these strategic cities, it is no time for Richmond, Greenfield, Greencastle, Danville and Connersville to help the Bell in its fight against the independents in these cities by throwing business to its toll lines. If there are places to which the independent toll lines cannot carry your message, it is for you to say whether or not you will deliver the message to the Bell or any other company for transmission. But to the places where you can send toll line messages by independent lines, you are in honor bound by every law of fairness to do so. While it is admissible to give our enemy a cup of cold water, it is not the ethics of warfare to hand over to him our ammunition. If for any cause the independent toll line system of this state should be seriously crippled or broken down, you would see speedily thereafter Bell exchanges springing up in places where it would be the height of folly for it now to make the attempt to establish an exchange. With the independent exchanges and toll lines unanimously co-operating with each other, the independent system is invulnerable to the opposition both now and forever. But if each should attempt to order his course in his own way our individual strength becomes our only defense. Dual toll line connections need not necessarily destroy our reliance upon one another, as much as we may deplore it. Whatever may be our individual views as to the expediency of such a move, the fact remains that with loyalty to each other in the interchange of business, and by co-operating with one another on the principles of independent telephony, we will continue to be a system that is invincible in its fight against monopoly, and strong enough to overcome all weakness that may develop in the conduct of our business. Loyal co-operation has already proven our system mightier and stronger than corporate organization has made the monopoly. May it remain so.—*Abstract of an address given at the Indiana convention.*

Dinner to Thomas B. Doolittle

A number of friends of Thomas B. Doolittle entertained him at dinner at the St. Botolph Club, Boston, Tuesday evening, May 4. Mr. Doolittle has been identified with the Bell telephone interests since 1879, and this dinner celebrated the thirtieth anniversary of his service. The dinner was entirely informal and restricted, the number of guests present being limited to those who were immediately associated with Mr. Doolittle in his work.

The activities of Mr. Doolittle have been of a most important character. His early conception of the importance of long-distance business was shown in his recognition of the importance of hard-drawn copper wire in telephony. If he had in no other way contributed to the advancement of the art, this achievement, which was recognized by the Franklin Institute with the gold medal of merit, would entitle him to a permanent place among the pioneers in telephony.

Those present at the dinner were: J. J. Carty (who presided), T. B. Doolittle, E. J. Hall, F. P. Fish, T. Cotter, G. D. Milne, R. W. Devonshire, H. V. Hayes, C. R. Truax, S. A. Richardson, A. M. Allen, C. W. Pitman, T. B. Bailey, T. E. Pigott, W. S. Allen, A. C. Blood, F. C. Ross, J. Wyman, F. A. Buttrick, F. E. Warner, C. J. H. Woodbury, C. B. Doolittle, V. M. Berthold, J. C. T. Baldwin, A. A. Marsters and S. H. Mildram.

The Life of Galvanized Iron Wire

By Ralph Raymond

IT IS a matter of common experience among all large users that iron wire which lasts many years in the open country inland will rust out in a remarkably short time when exposed to salt breezes, factory smoke or other corrosive influences.

It is also a matter of common knowledge among farmers using wire fencing as well as among telegraph and telephone men that there is a very great difference in the longevity of different grades of wire, the cheaper grades rusting out in a fraction of the life of higher priced grades.

For these reasons it is of manifest importance in buying wire for a given situation to choose the most suitable grade for that situation, the one which will be cheapest in the end, considering both its first cost and its probably length of life.

In view of the extensive use of galvanized iron and steel wire in the construction of telephone systems, the dearth of comprehensive information concerning the life of wire of different grades under various climatic and atmospheric conditions prompted the writer to make an investigation of the subject and a collection of data from the actual experience of users of this wire in all parts of the United States. This paper gives a summary of the results of that investigation.

The three grades of iron or steel wire used for telephone lines are known in the wire trade as steel, BB or best-best, and EBB or extra-best-best.

Steel wire has the virtues of superior strength and low price; the faults of high resistance and of short life under adverse influences. Its use is generally advisable for long spans, in localities where high winds or sleet storms are prevalent, for supporting aerial cables, either as single wire or stranded, and for short lines where the atmospheric conditions are favorable. EBB wire has a low resistance and is verly slowly attacked by corrosion, but its price is comparatively high. Its use is recommended for long lines and at railroad crossings or near the seashore, and in general for situations where the transmission or corrosion-resisting requirements are high without being enough so to warrant the use of copper. BB wire is in all respects intermediate between Steel and EBB, and is mostly used for general purposes, such as farmers' lines, distribution from cables, etc. The practice of different telephone companies varies, however, according to their local conditions and their experience.

The distinction between the different grades may be drawn in three ways: according to the chemical contents, according to certain physical properties or according to the method of manufacture.

The manufacturers class their product mainly according to the percentage of carbon it contains, carbon being an element, ever present in greater or less amount, which increases the hardness and tensile strength of the metal. According to this classification a very soft iron wire with almost no carbon is EBB, a mild steel wire with very little carbon is BB, while one with sufficient carbon to render it considerably harder and stronger is classed as Steel. Incidentally, the better qualities of wire contain smaller percentages of the impurities, sulphur, phosphorus and manganese, and in consequence are tougher, have a lower electrical resistance and are less subject to corrosion.

The telephone engineer in buying wire seldom has a chemical analysis made, but depends upon a physical inspection, fixing for each grade certain requirements as to electrical resistance, tensile strength, ductility and condition of the surface. He really bases his classification on the resistance, which is to him one of the most important characteristics of the wire, aside from a low resistance being an indication of excellence in other respects. At a temperature of 68° F. the resistance in ohms of one mile of any size, multiplied by the weight in pounds of one mile, should not exceed 4,800 for EBB, 5,600 for BB or 6,500 for Steel. Having fixed the maximum allowable resistance, the specified tensile strength is made as great as experience shows to be commercially practicable with wire of such grade, usually 2.8 times the weight per mile for BB and EBB and 3 times the weight per mile for Steel. For the rest, it is usual to specify for all grades used in telephone work that the wire shall be cylindrical, free from scales, inequalities, flaws, splints and other imperfections, and that it shall be capable of taking fifteen twists in six inches without injury.

The usual physical tests are doubtless adequate to prove whether or not a sample is a good wire of its grade, and further insight into its characteristics can be had through a chemical analysis, but to obtain a clearer understanding of the reasons underlying the wide variations in length of life it is necessary to look into the processes of manufacture.

The nomenclature of the grades of wire is, of course, a relic of the days before the cheap steel making processes had assumed their present pre-eminence, when wrought iron was made in great quantities and in a number of different grades. At the present time it may be stated in a general way that a fair grade of steel is cheaper than an equivalent grade of wrought iron, and that wrought iron is therefore generally made only in good grades for special purposes.

The practice of various makers may differ, but that of one of the principal producers in the United States may be taken as fairly representative of all. This producer uses Bessemer steel for Steel wire, low carbon basic open-hearth steel for BB wire and genuine Swedish puddled wrought iron for EBB wire.

For the following brief description of the processes of manufacture and of the processes of corrosion as they are believed to operate the writer is indebted to bulletin No. 239 of the United States Department of Agriculture, by Dr. Allerton S. Cushman, to which reference is made for a more

extended discussion of this very interesting subject.

The three processes, Bessemer, open-hearth and puddling, start with cast iron as a raw material. This contains a large amount of carbon and smaller quantities of sulphur, phosphorus, silicon and manganese, which are introduced as impurities in the ore, coke and limestone employed in its manufacture. The different processes of steel and iron making have for their object to burn out as much as possible of the carbon and impurities, the requisite amount of carbon to give the desired strength and hardness being added to the purified iron in the case of steel making.

On account of its simplicity of operation and the large amount of metal that can be worked at one charge, the Bessemer process is the cheapest method of converting cast iron into steel. Described briefly, this process consists of pouring melted cast iron into a large pear-shaped vessel called a converter, furnished with a number of small holes in the bottom, through which a blast of air is forced under high pressure. By this means the carbon is nearly all burned out, together with the silicon. The iron, however, is slightly burned as well, and after the blow is over a certain amount of white cast iron containing manganese and known as ferro-manganese is thrown into the converter. This acts to reduce the iron oxide and prevent the formation of blow holes when the metal cools. Bessemer steel will generally be found to contain from 0.4 to 1 per cent of manganese. The addition of the ferro-manganese also brings the proportion of carbon up to the desired point.

The Bessemer process is not very effective in burning out the phosphorus and sulphur in the cast iron, and as these elements have a deleterious effect upon steel, making it brittle, the Bessemer process is not used if the cast iron to be converted contains a large amount of phosphorus and sulphur, or if a very fine grade of steel is required, but the open-heart process is employed instead.

In the open-hearth process the cast iron is melted in large basin-shaped furnaces lined with a natural rock material consisting of lime and magnesia. The carbon is burned out by the play of hot air over the surface of the melted iron, while at the same time the acid-forming impurities are absorbed by the basic lining. At the end of the run ferro-manganese is thrown into the liquid metal to flux it, as in the Bessemer process.

The puddling process is used for making wrought iron. The cast iron is melted in flat furnaces and then worked over in the presence of air by means of tools in the hands of skilled workmen. By this means the impurities are slowly burned off, and a very pure iron results. The slag or cinder which forms from a combination of iron oxide and silica is worked thoroughly into the metal, so that when it comes to be rolled not only are the impurities very evenly distributed throughout the iron, but it possesses the structure of a bundle of fibres, each one of which is protected from subsequent rusting by a coating of cinder. The puddling process is very expensive as compared with the Bessemer and open-hearth processes.

After a run of a Bessemer converter or open-hearth furnace the metal is run into molds, forming ingots. For the manufacture of wire the ingots are reheated to a bright red heat, rolled down and cut into lengths of a certain shape and size, known as billets.

The puddling process results in a lump of wrought iron which is first rolled and hammered to give it a fine grain and to work off the excess of slag. The result is a piece known as a bloom.

The billets or blooms are rolled hot into wire rod several sizes larger than the finished wire is to be. This is pickled in sulphuric acid to remove the outer scale, then soaked in hot limewater to remove the acid and baked for about half a day, when it is drawn cold through dies of hard steel to the required gauge. The lime coating on the wire lubricates it and prevents it from cutting out the dies.

The wire is now ready for galvanizing, which means giving it a coating of pure zinc, and as a first step it is annealed by running it through brick tubes heated by coal or gas.

After cooling the wire enters a bath of dilute hydrochloric acid, which cleans it and removes any scale that may have formed during the process of annealing. This is a necessary treatment, as the wire would not take the zinc if it had not first been through the acid bath. Some manufacturers wash the acid off before the wire enters the zinc bath, others do not.

The wire is next run through a long vessel containing melted zinc at a temperature of 800° to 850° F. As it emerges it is run through wipers, which wipe off the excess zinc and leave a smooth coating. The amount of zinc on the finished telephone wire is stated by one manufacturer to be from 140 to 150 pounds per ton of wire.

Bare iron exposed to the weather is rapidly eaten away on the surface, chiefly on account of electrolytic action between neighboring bits of metal of different chemical constitution, which takes place when the iron is wet from rain or fog. All rain water contains small amounts of salts dissolved from the dust in the air, and is therefore an electrolyte. Water falling during a thunder storm also contains a small quantity of nitric acid. The action is especially rapid near the sea, on account of the great amount of salt in the fogs and rains, and in the neighborhood of railroad tracks and manufacturing plants on account of the sulphur-charged smoke present, which dissolves in the rain water as sulphuric acid.

There is a great variation in the way different irons rust. One will cover itself with a superficial layer of rust, which then acts as a coating protecting the underlying metal for many years, while another will pit so badly that the corrosion eats to the heart of the metal in a short time.

Puddled iron rusts slowly because after the outer layer of iron fibres is eaten away a coating of slag protects the next layer, which can not be attacked until the coating becomes cracked and breaks off. Then the next layer of iron is oxidized, exposing a fresh layer of slag, and so on.

That steel rusts more rapidly than puddled iron, and pits rather than corrodes evenly over the surface, is thought to be due to two reasons; first, because the structure is crystalline and there are no protecting layers of slag, and second, because it contains a large amount of manganese, which is unevenly distributed throughout the metal. As explained above, in describing the manufacture of Bessemer and open-hearth steels, the addition of manganese is necessary for the production of sound ingots, but as the metal cools the manganese tends to segregate, making the metal non-homogeneous. This results in local differences of potential when the metal is covered with dilute salt or acid solutions, and rapid cor-

rosion occurs in spots, where deep pits are eaten into the metal.

Iron wire is covered with zinc for the purpose of protecting it from the elements. As long as a continuous coating of zinc covers the iron, the latter can not be attacked. The zinc itself is attacked on the surface, but the oxide and carbonate formed are insoluble in water and protect the zinc underneath. If there is sulphur in the air, however, it will convert the insoluble carbonate into a soluble sulphate which the rains will wash away, exposing fresh surfaces of zinc to the corrosive influences.

All zinc coverings on iron wire are more or less porous, and when the wire is bent the zinc is apt to crack and flake off. Therefore the galvanizing process is by no means an absolute protection to the iron wire. It does protect it to a great extent, however, because as long as there is any zinc left it will tend to corrode in preference to the iron nearby, thereby greatly reducing the corrosion of the latter.

A further advantage of puddled iron wire may be mentioned in this connection. On account of its fibrous structure the surface of the wire before galvanizing is not as smooth as that of steel wire, and consequently the zinc clings to the puddled iron better than to steel.

In the endeavor to obtain actual data on the life of the different grades of wire under different climatic conditions, investigations were made of the results experienced in all parts of the United States.

In classifying the data it may be divided into that obtained in territory entirely inland and that from territory adjacent to the seacoast.

In territory entirely removed from the influence of salt air but extending over the entire country it is found in general that wire will last from fifteen to thirty years in country districts where there is little or no smoke, from five to fifteen years in small towns where there is little soft coal smoke, from two to eight years in large cities where soft coal is used or near a railroad and from one-half to two years near blast furnaces, smelters or railroad yards. The fact that there is a considerable range of experience for any one set of conditions is due partly to the fact that the decay is gradual and one superintendent would consider the useful life of a particular wire ended when another would allow it to remain in service considerably longer, partly to the use of different grades and sizes of wire and partly to prevailing conditions of dryness or moisture in the atmosphere and the direction of the prevailing winds, which in some cases carry corrosive gases from railroads, etc., to the wires, in other cases away from them. It is to be emphasized that it is not smoke alone which is ruinous to iron wire, but the sulphurous gas in the smoke dissolved in water, and therefore the normal condition of the atmosphere as to dampness is a most important factor where smoke is prevalent.

Very little direct evidence could be obtained in the way of comparative figures for the different grades and sizes of wire, but a good idea of the relative life of different grades may be drawn from the fact that the users of EBB wire interviewed gave estimates varying from fourteen to thirty-five years for this wire under the most favorable conditions, while the figures given for Steel wire under similar conditions ranged from six to fifteen years only.

In one locality, a manufacturing district, where both kinds are used, five years is found to be the average life of Steel or BB and eight years that of EBB.

One line of EBB wire was found which had lasted twenty-four years in a town where, however, wood was the only fuel used, and another example of an imported soft iron wire which was strung along the track of a railroad using soft coal and which had lasted twenty-seven years. On the other hand, in a soft coal-burning town not far distant steel wire is found to last only three and one-half to four and one-half years.

One large user of steel wire had made some very interesting observations on the relative life of the zinc coating and of the iron after the zinc has disappeared, finding that in cities and towns the zinc lasts two years, and after it has gone the bare steel lasts one year more if it is No. 14, or three years more if it is No. 12.

Although it is found that iron wire is very short lived in the vicinity of chemical works generally, it is nevertheless superior to copper when exposed to chlorine gas which is given off from some chemical works.

Near the seacoast the life of iron wire is more uncertain than elsewhere. On the Pacific coast even EBB wire has a comparatively short life, apparently on account of the exceptional prevalence of moist and foggy conditions. In one town it is stated that its life is only one year, and in general it runs from two to seven years, being greater farther north. In one city a difference of two years is found between wire in the business part near the water front and that in the residence district away from the water.

On the Atlantic coast wire has a longer life, about seven to eight years in the absence of smoke, but only two years when salt and smoke are combined.

Aside from differences in the prevailing condition of the atmosphere it seems probable that great differences in the length of life on the coast can be explained as due to differences in quality of galvanizing. Salt appears to act comparatively slowly on the zinc, and if there is no sulphurous smoke present the wire may last in perfect condition a long time, but if the zinc coating is porous or broken the salt solution has a very rapid effect on the exposed iron.

Indiana Independent Convention

The fourth annual convention of the Indiana Independent Telephone Association was held in the Claypool hotel, Indianapolis, May 12 and 13. President C. S. Norton in his address reviewing the work of the year, said the association had largely increased its membership and that only a few of the 454 independent telephone companies of Indiana remain outside. The number of independent telephones added during the year brought the total up to more than 221,000. Toll business has increased until the messages average 100,000 a month, receipts amounting to $23,000. This is an excellent showing from the 100 companies now in the clearing house, which has been in operation nine months. Mr. Norton pointed out how a division of the toll was made on a mileage basis, the authority for making the rates being vested in the Clearing House Association. He told the managers of telephone companies to prepare to come under the jurisdiction of a public utilities commission, which, he said, would certainly be enacted by the next legislature and which he believed would be beneficial.

Secretary Allen J. Payton, in submitting his annual report, declared that the granting of a new 30-year franchise with increased rates to the Indianapolis Telephone Company had put new life and vigor into the independ-

ent movement throughout Indiana, and asserted that the Bell people would not gain control of the telephone business in Indianapolis—a central point essential to the independents. The reports from the district vice-presidents showed material improvement and increase in business.

The annual dinner was enjoyed by more than two hundred guests. City Attorney C. D. Bowan spoke for a single telephone system, under proper restrictions. This declaration started a hearty discussion by other speakers, who agreed, provided the single system was independent. James S. Brailey, Jr., who is at the head of the largest independent companies in Indiana and Ohio, talked on "Telephone and Other Securities," and asserted that, compared with other public service companies, the independent telephone companies have far less water in them, and as a rule the securities represent actual investments. He declared that the stability in earnings was sufficient to place and to keep telephone securities in more active demand than any other securities. He insisted that the strength of the independent companies was found in the fact that they were home-owned—80 per cent of independent telephone property and stock being owned by home people. M. L. Clawson, W. R. Hough, A. J. Payton, E. M. Wasmuth, N. G. Hunter, Theodore Thorward and F. O. Cuppy made characteristic after-dinner talks, each declaring the position of independents impregnable. James P. Goodrich presided as toastmaster.

The morning session of the second day was opened by an interesting and instructive talk on "Telephone Laws and Legal Decisions," by Hon. Thomas E. Davidson. Mr. Davidson pointed out just what rights the companies had under a number of conditions and circumstances constantly arising. He advised telephone companies to employ good attorneys to advise and keep them out of trouble. "Extent, Limit and Rate for Party-Line Service" was a subject assigned to Thomas D. Sheerin. Mr. Sheerin, though a young man, made a good impression and is thoroughly familiar with his subject. He pointed out that the earnings of party lines were much greater than single lines when cost and maintenance were compared. He declared that it was generally admitted that country service was furnished at a less cost, and even though the party-line rate is lower, the country patron is better pay and in the end the party lines were the better revenue getters.

Walter J. Uhl read a paper on the advisability of paying for extensions out of earnings. Mr. Uhl said the practice is not a good one and is conductive to trouble, especially while the present low rate is maintained. He advocated that dividends be paid out of earnings, after the necessary reduction had been made for depreciation and repairs, and urged the safer plan of extensions being made by the sale of new stock rather than by bond issue. With proper capitalization and payment of dividends on it, telephone securities could thus be made standard, and a steady demand for them could be maintained. J. W. Coffey read a paper on "The Clearing House," giving in detail a full account of its organization, purposes and utility. Mr. Coffey declared that the clearing house was absolutely essential to the future life and prosperity of independent telephony and predicted that within two years every company in the state would be a member.

The present officers, C. S. Norton and J. W. Payton were re-elected president and secretary respectively. The next annual convention will be held in South Bend, where the meeting of the Michigan Association will be held at the same time. Some of the sessions of the two bodies will be joint meetings.

Judge Tayler Denies Injunction in Ohio

On the ground that it would restrain trade, Judge R. W. Tayler of the United States circuit court has dissolved the temporary restraining order and denied an injunction in the case of the United States Telephone Company against the Central Union Telephone Company and the American Telephone & Telegraph Company. It was sought to set aside the 99-year contract the Bell company has with the United States Telephone Company for long distance service. The suit was filed last fall.

Judge Tayler concludes his decision with some caustic references to monopolies, which he affirms may be conducted either by the Bell or the independent interests. He says:

"The position which counsel for complainant takes comes to this when we analyze it: The Bell Telephone Company is a wicked monopoly. Some years ago the United States Company concluded to fight it. The only way to fight the devil was with fire. The only way to fight the monopoly was to monopolize all unoccupied territory. The way to monopolize this unoccupied territory was to go to a local telephone company which had no long distance connection and offer to give it such long distance connection, provided a perpetual monopoly of it was given in return.

"This purpose to destroy the Bell monopoly may be admitted to be virtuous. The method resorted to was vicious. It was a mere repetition and imitation of the methods which, when followed by the Bell company, are so bitterly denounced. The philosophy that the end justifies the means, when the end is virtuous and the means vicious, has long since been discarded, if it ever had any avowed supporter. But even that philosophy cannot apply to a mere business undertaking. The purpose to destroy the Bell monopoly was not a virtuous purpose; it was a business proposition, which incidentally led, we may assume, to a righteous result.

"What becomes of the righteous result when the means to accomplish it are the means of unrighteousness? The ultimate result of this may be that we discover we have exchanged one master for another. Counsel of course, will not deny that if the Bell company should acquire control of the complainant, these contracts would be just as valid and the shield of our defense would be turned into a weapon with which to destroy us.

"Are the courts to turn themselves into inquisitors of the minds of men and say: 'Here is a man who wants to do the world some good. The ultimate result promises to be beneficial, but, in order to accomplish it, he must monopolize the business of some community and must violate the law. May he do so?' These questions were long ago answered, yet they come up again and again.

"The sum of it all is that it does no good to destroy one monopoly by creating another. Monopolies all look alike to the law. When they use their power unlawfully it is for the law to take suitable steps to punish the offender and prevent recurrence of the offense.

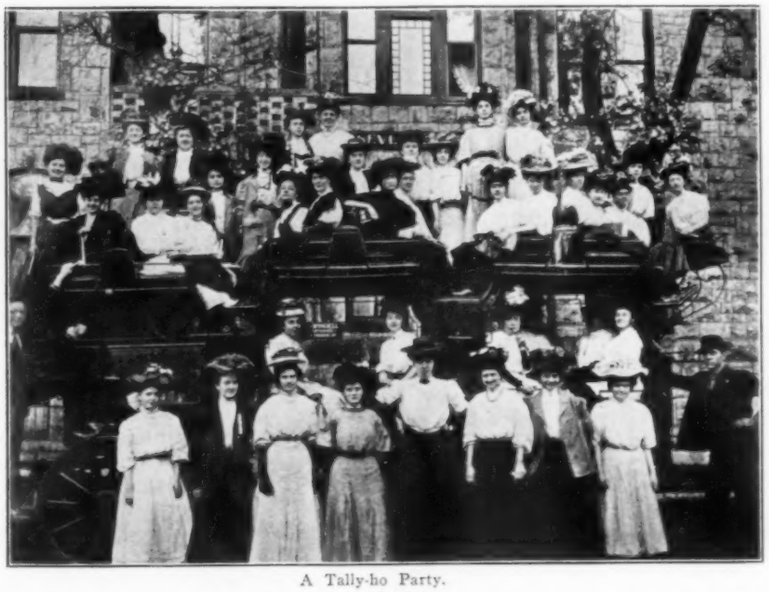
"The situation would, I suspect, appear less complicated if the conditions were reversed and the attack were being made on a similar contract made by the Bell company."

It is expected that the case will be taken either to the United States court of appeals at Cincinnati or to the United States supreme court.

Recreation for the Operator

By O. N. Livermore

THE idea of giving the operators in Chicago telephone exchanges the chance to get out doors for a few minutes between times all started through the kindness of some Lake View church people. The church stands next to the telephone exchange; and it also has quite a large, grassy back yard. Presumably, some of the good people in authority at the place of worship observed the girls in the exchange were casting longing glances at the bit of green. At any rate, the offer was made spontaneously to let the girls use the yard, provided they would keep it in good condition.



A Tally-ho Party.

We may be sure that it did not take long for this taste of outdoors to work its inevitable beneficial result; for now recreation gardens are provided by the company for the use of the operating forces wherever property lines permit.

The operators themselves usually take care of the flowers, the ground being apportioned to certain groups of girls, in some offices, which arouses a little friendly competition. Frequently a corner is reserved for lettuce and radishes, to vary the menu at luncheon.

The signal bell is arranged to ring in the garden as well as in the operators' quarters, and in some of the offices a small clock is hung in a convenient place for the benefit of the girls during their rest period.

Humboldt's Flowery Entrance.

Inspired by the results of the operators' garden, the maintenance men at Edgewater started a rival one in the rear of the exchange.

It would not be fair to mention the flower beds in the gardens without calling attention to the beautiful flower boxes that the girls keep on the window-sills of many of the exchanges, as well as at the doorways, on the stone copings and even in the corridors. The Humboldt exchange is a good example, and the illustration shows quite clearly how the flower boxes at the entrance of the building are kept full of vines, ferns and flowers.

It is obvious that not all exchanges are so situated that they can afford space for gardens on their property. The company always insists on the outdoor feature in some form or other, however, and where the ground space is insufficient there is always a roof available. The roof garden at the Main exchange is typical, and is shown here. Wentworth, Lincoln and Oakland have roof gardens.

Perhaps, in connection with this matter of outdoor recreation, it is not amiss to mention the summer excursions of the Chicago Telephone Company's operators. An appropriate spot in the way of a summer resort having been selected, the company arranges special rates for the girls, provides a sufficient number of boats and similar necessities of outdoor life, and, last but not least, engages a chaperone to remain at the spot until the season is over and the last bunch of operators have returned to the city. For the last three years Saugatuck, Michigan, on Kalamazoo Lake and River, has been the chosen haven of rest. This year another place will be selected, just for a change. The new spot has not yet been decided upon; but wherever it is, the girls are assured it will contain all the features that contribute to happy life in the country. The girls will

The Humboldt Garden.

have the opportunity to romp, and row, and swim, and fish, and ride on hay-racks, and do all the other things that girls do when they get a few days in the country.

No statistician has ever figured the benefits to the telephone company, in dollars and cents, that accrue from this policy of giving the operators all the outdoor air and interest they can find time to use. It doesn't need to be figured. The value of the great outdoors, even when it can only be had in small morsels, has come to be a matter of universal knowledge.

The telephone operator's work is quite a producer of "nerves." That is why operating companies arrange frequent periods of rest for all the operators, calculating wisely that the exaction of continuous and long hours of work will, in the end, be a detriment rather than a benefit to the service. And if the ordinary rest room has been found so conducive to health and efficiency in the operating room, how much more valuable is the open air garden, whether situated in the yard or on the roof? The dividends it pays are beyond mere figures. They consist of brighter eyes, calmer nerves, easier operating courtesy, quicker service, happier employees, better satisfied subscribers.

Lake View Garden.

The Roof Garden on Main Exchange.

The Chicago Telephone Company lays claim to the best and most complete arrangement of outdoor gardens for its operators that exist in the country. Comparisons are invidious; but it is said that the first roof garden was installed in Chicago after a visit to a large eastern city and an inspection of its solitary garden had convinced the Chicago Telephone people that they could do very much better without half trying. No doubt they finally went farther than just half trying; for everybody connected in any way with the innovation entered into the idea with so much enthusiasm that it is no wonder Chicago leads in the matter of providing fresh air and blue sky for its telephone operators.

The girls, too, are not backward in taking advantage of the opportunity to secure a change of scene for a few minutes every day. They are as proud of their gardens and flower beds as if they held a private ownership in them; and, indeed, they do, for after all the most pleasing features are the work of the girls' own hands.

Then, too, there are always enough moving spirits in a big crowd of girls to get up interesting little trips and picnics once in a while. Not infrequently all the girls of an exchange arrange a tally-ho party to some pretty grove, where they string countless Japanese lanterns and eat their basket lunches and play games until it is time to start on the homeward road. Of course, everybody has a splendid time; and no doubt the world looks better and rules are much easier to observe for the next few days.

The newspaper press of the country has said much to convince the layman that the life of the telephone operator is a hard one. As stated above, it has its hardships; but it can truthfully be said that there is no line of work in which girls are engaged where so much has been done to lighten the burden of daily toil. Altogether an extraordinary amount of attention has been devoted to providing recreation for the operator.

Garden at Hyde Park Exchange.

How to Read Telephone Circuit Diagrams

By David S. Hulfish

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LESSON VI.

IT does not require a deep knowledge of telephony to see that important changes in the central office equipment may be made without any changes whatever in the substation or subscriber's telephone equipments. Conversely, there may be changes in the substation equipments without changes in the central office, or even there may be many types of substation equipments, differing from each other, all working at the same time in connection with a single switchboard.

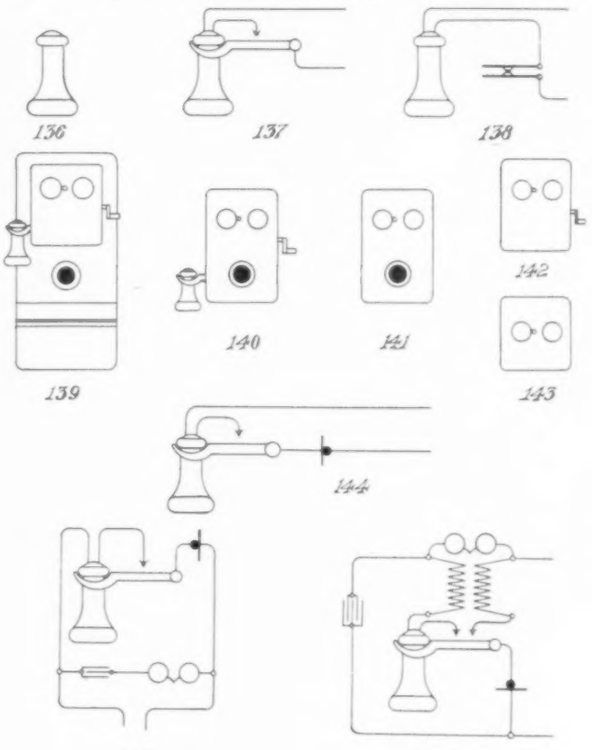
It is seen, then, that the dependence between the switchboard and the substation is not one which is very rigid, but one which pertains more to general principles or general requirements only. A magneto switchboard is a switchboard which has signal receiving devices (to enable the subscribers to signal to the operator at the switchboard) which are suitable for operation by current from a magneto or hand generator. Such a switchboard requires that the substations be provided with hand generators that they may be able to operate the central office signals, or drops. The use of the annunciator drop form of central office signal also prevents the presence of any current upon the telephone lines in any considerable quantities, since such currents would trip the drops. A magneto switchboard therefore requires that its substations furnish their own talking current or talking energy of whatever kind, and that the substations have each a hand generator or equivalent device.

The common battery or central energy switchboard is even more lax in its requirements. Almost any kind of a substation telephone will work in connection with a common battery switchboard. The substation may have a hand generator, or not; it may have local battery transmitter or not. The only requirement of a common battery switchboard is that the line circuit be closed at the substation when the hook is up, and open to direct or battery currents when the hook is down.

The reader should bear in mind that this page is a part of a treatise on the reading of telephone circuit diagrams, and not a treatise on correct methods of telephone engineering. In correct telephone engineering, the substation equipment shall be of a design in harmony with the central office or switchboard design, that a maximum efficiency for a desired character of telephonic transmission may be attained. In any circuit diagram dealing with a switchboard, the details of the substation may be assumed to be cared for by another diagram, or by other means, and for the purposes of the switchboard study it is required only that a substation telephone be indicated, without a definite specification of its minor details.

A very great part of the art of the pictorial artist is exercised in subduing or in leaving out altogether the unimportant details involved in his subject. The novelist, too, omits the minor details, or treats them lightly, briefly, suggestively. The skilled maker of telephone circuit diagrams exercises the same art, subduing the unimportant details, and for the same purpose, namely, that they may not lead the attention from the more important and the really essential features of the diagram, and that they may permit the attention of the reader to concentrate upon the important details of the diagram and thus present definitely and forcibly that portion of a telephone system which it is the purpose of that particular diagram to present.

In a diagram having to do only with the circuits of a switchboard, the minor details of the substation telephone are negligible, as we have seen. In most instances it is necessary only to show that the central office apparatus works in co-operation with a substation or a number of them. A need exists therefore for a symbol indicating the substation telephone as a whole without definite specification as to the details thereof, frequently neither mechanically nor electrically, it being assumed in such an



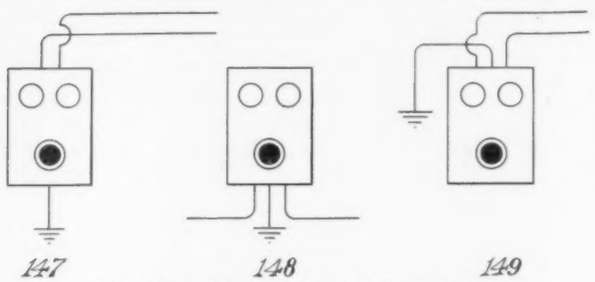
Figs. 136 to 146. Symbols for Complete Substations.

instance that the substation is a proper one to co-operate with the central office equipment shown.

The simplest, and at the same time the most comprehensive of symbols for a complete substation telephone equipment is the symbol of Fig. 136. Merely a hand telephone. It will be recalled from earlier lessons that the telephone receiver, when equipped with a permanent magnet, may be used as a transmitter as well as receiver. When sufficiently powerful and abrupt currents are passed through the receiver, the sound produced is loud enough to be heard in a quiet room. It is therefore not only a receiver and transmitter but a signaling device for calling the patron to the telephone. Taken in connection with a circuit showing a magneto switchboard, it is nec-

essary to assume that the substation represented by Fig. 136 is equipped with a hand generator. In connection with a central energy circuit it is necessary to assume that a switch of some kind, presumably a hook switch, is associated with the receiver, to open and close the line circuit through the substation to control the signals at the central office, as the central office details of the circuit diagram may require.

An amplification of the symbol of Fig. 136 is given



Figs. 147 to 149. Substation and Earth Symbol.

in Fig. 137. The maker of the diagram here shown evidently was dealing with a common battery central office, and by adding the hook lever and contact all necessary details for the operation of the central office system have been provided. Such a substation equipment, comprising only receiver and hook switch, would be very inefficient for a modern telephone plant, and therefore it must be read, not as a complete diagram showing all details of the substation, but merely as a symbol representing a complete substation, equipped with all that is needful or customary to co-operate fully with the central office, or other more detailed portions of the telephone system set forth in the diagram where this symbol is found.

In Fig. 138 the device adjacent to the receiver might be hook switch contacts such as those of Fig. 71 with the hook lever not shown, or it may represent a transmitter as indicated in Fig. 22. The meaning of the *part* of the symbol is immaterial, since it is clear that the symbol of Fig. 138 is intended to be read as a *whole* to represent a complete substation equipment.

A common symbol is that of Fig. 139. It is so elaborate as to constitute a picture rather than a symbol, but is even then easier to draw than the complete circuits required to say as much as this symbol says, and furthermore it is noncommittal as to the specific circuits embodied. Such a symbol is met in infinite variation of detail. Fig. 140 is a slight simplification, but one which still retains the crank to indicate that it is adapted to operate where magneto calling generator is required. Fig. 141 omits the crank from Fig. 140; if associated circuits permit, this symbol may be taken to indicate that the substation pertains to a central energy system. Fig. 142 reduces the magneto substation symbol by omitting the receiver, the hook and the transmitter (perhaps because the draftsman found them difficult to draw) and Fig. 143 simplifies still further by omitting the generator crank. In Fig. 142 only the signaling equipment of hand generator and ringer is indicated, but if used alone at the end of a telephone line connected with a magneto switchboard it would be understood that a complete substation equipment is symbolized, and that the talking instruments are assumed to be included in the substation indicated by the signaling apparatus only. While Fig. 143 shows a ringer only, the telephone equipment may be assumed if the complete circuit diagram requires it.

In circuit diagrams dealing with central energy systems, the electrical conditions of the substation are simpler than those of a magneto substation having local battery transmission, consequently the electrical circuits are more likely to be shown than in diagrams representing magneto systems. Notice Fig. 144, which shows very simply a complete talking equipment for a common battery substation. When found in connection with a line running to a common battery switchboard, this symbol should be taken to represent a complete substation telephone, with ringer and condenser, all mounted neatly in a box and fastened to the wall, if you please.

Fig. 145 repeats the symbol of Fig. 144, but adds a ringer, bridged from wire to wire of the line pair, with condenser in series to prevent the flow of battery current. This symbol now is a complete representation of all that is needed in a common battery substation, but still it should be regarded as a symbol, and read as a single unit of the drawing. Fig. 146 presents another substation in circuit form which is so widely used that it has become an integral symbol for a common battery substation equipment, and should be read as such.

Many line and substation circuits require, in addition to the two line wires, a ground connection in fulfillment of some of the requirements of the central office apparatus. Such a condition may be indicated by a third conductor leading in any manner from the substation symbol to an earth symbol near it. Figs. 147, 148 and 149 show this variation as applied to a symbol of the type of Fig. 141.

A drawing forming a part of a United States patent is taken as the basis for Fig. 150. In this, a private party line is shown diagrammatically. The line consists of two branching conductors terminating in telephone substations presumably all alike. Diagrammatic representation of one substation is made, but the remainder are merely indicated by circles. In many instances rectangles are used

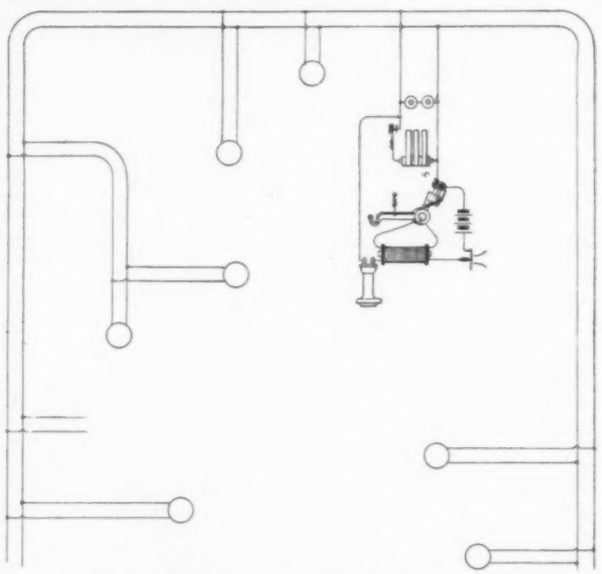


Fig. 150. Party Line, Showing Substation Symbols.

to indicate the complete substation, in the same manner as the circles of Fig. 150.

Finally when a pair of conductors run from a switchboard jack and line signal to any nondescript symbol, it may be assumed in beginning to read the diagram that the nondescript represents or indicates a complete substation equipment of such character as to operate in harmony

with the jack and line signal or other central office equipment.

The jack and the plug jointly form a switching device. It is more logical to consider them as co-operating parts of a switching device which may be separated, similar parts of many such switching devices being interchangeable, than to think of them as separate units, since neither alone is a complete device for any purpose.

The jack is a fixed switch member, uusually presenting at the face of the switchboard a cylindrical mouth portion, behind which are spring members, some of them possibly being electrical switches within and among themselves. The body of the jack surrounding the mouth usually is of conducting metal.

The plug is a companion member to the jack, and is adapted to engage certain or all of the jack members. The plug comprises a handle for its manipulation and a projecting shaft for entering the jack and for engaging the springs at the rear of the mouth of the jack. Of conductors, the plug may have one or more; the jack likewise may have one or more conductors to engage electrically the conducting portions of the plug. The plug and the jack which are to co-operate must be designed for each other; beyond this, there are variations in design which are likely to influence the symbols used to represent the devices.

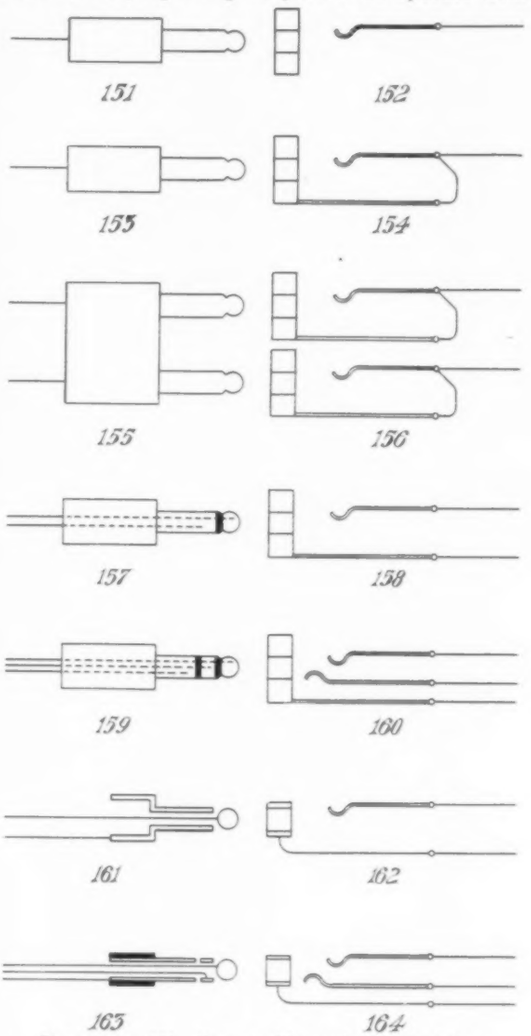
The use of jacks and plugs in a switchboard may be understood from the lesson on simple switchboard circuits preceding this. The line terminals are the jacks, and the switching devices consist of pairs of plugs. Flexible conductors or cords connect the two plugs of each pair. The first function of a plug and jack is to connect the conductor or conductors of the plug and its associated cord with the conductors of the jack, but further operations may be involved to satisfy the requirements of signaling circuits or other details of the switchboard and its operation.

In Figs. 151 to 164 are presented plug symbols of the types most usually met where the plugs are not specialized for some purpose, and also jack symbols most usually met where the jacks are merely offering terminals for the connection of conductors in the plug, without any switching of conductors within the jacks themselves. The solid plug, or one-way plug, is shown in Figs. 151 and 153; in Fig. 152 and jack offers the spring for the conductor which is to take the plug connection; in Fig. 154 the body of the jack and the spring are connected together, thereby offering a greater chance of good contact with the plug, and this form of connection usually is met. A two-conductor plug formed of two solid plugs set in one handle is shown in Fig. 155, and in Fig. 156 the twin jacks adapted to take the twin plug are shown. This expedient usually is employed in testing boards, where the degree of insulation between the conductors of a double plug is required to be very high.

Fig. 157 shows a plug of the same general type, but having two conductors, the tip being insulated from the shaft or body. Fig. 159 shows the body divided; the three conducting portions of this plug are named "tip," "ring" and "sleeve," reading from right to left of the figure. Fig. 158 shows a jack similar to that of Fig. 154, but wired to take the two conductors of the plug of Fig. 157 separately. Fig. 160 shows a jack in which a second spring is present to make contact with the ring of the plug of Fig. 159.

The plug symbols of Figs. 151 to 159 represent side views of the plugs, while Figs. 161 and 163 represent sectional views of them; otherwise, Figs. 157 and 159 correspond to Figs. 161 and 163. Likewise, jacks of Figs. 158 and 160 correspond to the jacks of Figs. 162 and 164, with a distinction noticeable in the bodies of the jacks; Figs. 158 and 160 are drawn to represent the large cast-body jacks, while the smaller, thinner construction of the body portion of the jacks of Figs. 162 and 164 seems to represent a jack with the body or mouth portion formed from sheet metal, as is the custom with jacks which are mounted in hard rubber strips and set closely together in the switchboard.

In the figures, a plug and a jack are set opposite to each other, the plug being adapted to co-operate with the jack to make a connection; not only does this bring out the relation which exists between the respective plugs and their corresponding jacks, but this is the relation in which the two parts of the plug-and-jacks switch usually are located upon the circuit diagram. Occasionally the plug is drawn in its position when inserted in the jack. See Figs. 131, 134 and 179. When freak symbols are encountered, the presence of the plug by a jack, or of a jack by the plug, may enable the reader to determine that the unusual symbol is intended for a plug or a jack, as the case may be, and what the disposition of the conductors is.



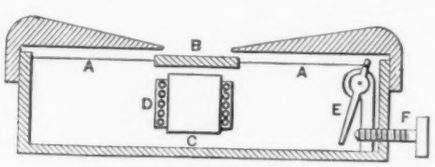
Figs. 151 to 164. Common Plug and Jack Symbols.

(To be Continued.)

A New "Mono-Telephone"

A new form of mono-telephone has been devised by M. Abraham, of Paris, and it was described at a recent meeting of the Electricians' Society.

The mono-telephone is an apparatus resembling a telephone receiver and it has a vibrating armature which, instead of being a thin iron diaphragm fixed in the support as we find in the usual telephones, is formed on the contrary of a large steel disk carried by three points of a nodal line, and it thus acts as a veritable resonator. An electro-magnet acts upon the central part of the disk, and when an alternating current is sent into the magnet, the disk sets up a vibration. The intensity of the vibrations depends on the period of the alternating current. If this period is very near that of the characteristic vibration of the disk, the latter gives a good resonance and the amplitude of the vibrations becomes considerable. We may almost say that the apparatus does not respond except for a single vibration period of the current, and this property is quite important for a great number of experiments. M. Mercadier has made a good application of this resonance in his system of multiplex telegraphy on the vibratory system, in which the vibrations are sifted out by means of mono-telephones which serve the purpose of resonators. Wireless telegraphy can also use the mono-telephone receivers, provided there is designed a type which is sensitive enough. In fact,



The New Mono-Telephone.

A, wire; B, armature; C D, electromagnet; E F, wire tightener.

M. Blondel proposed their use some years ago. The transmission can be made by rhythmic emissions, making the signals to succeed at equal intervals and of about one-hundredth second, so as to secure a vibratory effect. At the distant end we use a mono-telephone receiver which is operated by any form of coherer or detector. The telephone signals are taken thus by ear. (However, the mono-telephone can be also made to operate a relay.) The advantage of this combination is evident, and we now have an acoustic method of tuning which is added to the electric tuning or syntonizing methods so that we have an increased security for messages. However, this cannot be carried out if we do not dispose of a very high power as in the Cliffden or Glace Bay stations, which use 500 horse-power; it is scarcely possible to increase the frequency of the signals without reducing the power of each signal in proportion, and thus the distance for signaling is necessarily reduced. This method could be made possible by the use of an improved device which would be much more sensitive for its characteristic note than the ordinary telephone receivers, and this is not impossible. Thus the Blondel method would be capable of practical use, for the increase of sensitiveness would make us gain what the small power of the waves had lost. At the same time the signaling would be much easier from the fact of using low tensions.

The new apparatus designed by M. Abraham is a step toward this end. It is an ordinary telephone of any suitable form which has been modified so as to give an adjustable mono-telephone. The apparatus is constructed in a very simple form (see diagram). Some parts of the usual telephone are preserved, such as the box, the earpiece, the magnet. The iron diaphragm is removed and another armature is formed of an iron plate which just covers the electromagnet. This armature is carried by two flat strips or wires of a strong metal which are stretched parallel, and it is thus kept at the right distance from the poles. Such a system of suspension has an excellent elasticity, and the vibrations proper to the armature are clearly musical. We can vary the characteristic vibration of the instrument at will and between wide limits by acting on the tension of the wires by means of a lever and screw.

The author compared the sensitiveness of this form of receiver with that of other telephones of the same type. Both types had a sensitiveness of the same order except when they were used on rhythmic currents at unison with the proper vibration of the instrument, and the new apparatus then had a much greater sensitiveness than the usual telephone. In this receiver the functions of the telephone diaphragm are better separated than in the common telephone, as here we have distinct parts which play the part of the armature and of the elastic spring. The armature can be made very rigid and the spring can be given but an insignificant mass. The result is that, if desired, the proper vibration can be practically free from harmonics.

The undulatory currents which the instrument is thus able to sift out are not limited to a single octave. These currents can therefore correspond to notes of any height in the scale, provided that they in turn do not contain harmonics. But we can easily produce these undulatory currents without harmonics. Thus it is seen that we can produce an inexpensive device whose characteristic frequency can be regulated to any desired point and which has a much greater sensitiveness than the best telephone receivers. It is to be hoped that the new mono-telephone will aid in solving the present problem.—*Scientific American.*

The Missouri Convention

The two-day convention of the Missouri Independent Telephone Association at Kansas City ended May 20 with the election of officers in the afternoon and a banquet at night. More than 300 members of the association registered during the day, and 175 remained after the adjournment for the evening's entertainment.

At the morning session talks were made by G. W. Schweer, former secretary-treasurer; Houck McHenry, of Jefferson City; Stanley S. Lichty, Vinton, Iowa; S. D. Thompson, of Cameron, and J. N. B. Shelton, of Mount Vernon. After short addresses by W. R. Bardull, Windsor, traveling secretary, and F. S. Lyman, St. Louis, in the afternoon, the convention proceeded to the election of officers and clearing up of old business.

The following officers were elected for next year:

Dr. S. T. Neill, Clinton, Mo., president, and H. C. Todd, Maryville, secretary-treasurer. The executive board includes the president and secretary, together with William H. Bassett, St. Louis; A. F. Adams, of Joplin, and C. J. Meyers of Kansas City.

A resolution was passed empowering the association to employ a field man to further association work in the state for the coming year. It is probable that a joint session of the Missouri and Kansas associations will be held in Kansas City, next year.

New England Telephone Appraisal

THE Massachusetts Highway Commission has been engaged for the past year in securing a careful inventory and appraisal of all property of the New England Telephone & Telegraph Company. The firm of D. C. & Wm. B. Jackson, engineers and experts, of Chicago and Boston, was retained as consultant in this work, and the appraisal is in many respects the most thorough that has ever been made of a telephone property extending over a diversified territory. A report of the results of the inventory and appraisal has been made by Prof. Dugald C. Jackson of the above firm, and the Highway Commission has transmitted the report to Governor Draper, with the request that a special message be addressed to the Legislature for the appropriation of approximately $35,000 to enable studies to be made by which the equitableness of the rates may be determined for different classes of service.

As a result of its work the commission is now in a position to determine not only the value of any part of the plant which the company uses in any locality, but also the value of the plant used for each class of service. Studies of traffic, cost of operation, amounts needed for repairs, replacements, construction and reconstruction, and items chargeable to capital must all be considered to determine what rates are fair and reasonable in the various localities for different kinds of service.

Professor Jackson's report indicates that the total value of the company's property is estimated at $46,540,819. Of this the property valuation in Massachusetts is $34,133,270, and the valuation in adjacent states is $12,407,549. The company has 247 exchange central offices which provide telephone service for substantially all of Massachusetts. Of these offices forty-six are located in buildings owned by the company. The number of operators' positions at exchange switchboards is 2,367. The length of telephone conductors in the Massachusetts system is sufficient to provide nine complete two-wire metallic circuits around the equatorial circumference of the earth.

The results of the inventory and appraisal, arranged in tabular form, appear at the end of this report as exhibits 1, 2, 3, 4 and 5, respectively. Exhibit 1 shows the extent of the company's plant in Massachusetts and Exhibit 2 shows the total value of property in Massachusetts divided as in Exhibit 1. The value given for each kind of property in Exhibit 2 includes the value of all the collateral materials that accompany the particular main division.

The appraisal shows that the total value of the physical plant used for local service is $22,885,082. The total value of local plant in metropolitan Boston is $4,463,843, and in the suburban district immediately surrounding, $6,446,838. The total value of local plants in the eleven cities of the state which are of substantially 50,000 inhabitants or over, is $6,872,411. The remainder of the local plants in the smaller cities and rural districts amounts to $5,979,248. The total value of the roll plant is $9,641,913, which is 42 per cent of the value of the local plant. The average net current assets and cash on hand which enter into the company's capital amount to $1,560,000. This represents the funds that are required in its current operations.

When the appraisal was taken (midsummer, 1908) there were 42,749 telephones in use in metropolitan Boston; 34,888 in the inner zone of the suburban district; 19,456 in the outer zone; 56,729 in use in the eleven cities mentioned as a group before, and 54,540 in use in the remainder of the state. These are distributed as 20,201 main telephones; 17,143 private branch exchange terminal telephones, and 5,405 extension sets connected with 19,159 subscribers' circuits in the metropolitan district. There are 29,672 main telephones, 2,519 private-branch instruments and 2,697 extension sets connecting with 16,556 subscribers' circuits in the metropolitan district (five-mile radius of Boston); 16,875 main telephones, 702 private-branch instruments, and 1,879 extension sets connecting with 8,770 subscribers' circuits in the outer zone of the suburban district. In the eleven principal cities outside Boston there are 45,516 main telephones, 5,113 private-branch instruments, and 6,100 extension sets connecting with 23,581 subscribers' circuits. In the remainder of the state are 48,558 main telephones, 1,892 private-branch instruments, and 4,090 extension sets connecting with 19,399 subscribers' circuits. The inventory shows in detail the number of each kind of circuit and telephone for each of the 241 sections. The inventory and appraisal show accurately how much and what kind of property the company possesses in all parts of the territory which it serves.

For each $100 worth of property the company has outstanding 83.67 of par value in stocks, bonds and notes. The aggregate value of the entire property and a comparison of it with the total outstanding securities are shown in Exhibits 4 and 5. It appears that the company has been paying for such expenses as engineering and interest, especially on new construction, out of earnings instead of out of its capital account. The appraisal shows that the company has no water in its securities; affords information on which the commission can decide how much money the company should be allowed to return on its investment, and how much it should be reasonably expected to expend in the average year for reconstruction, against the ravages of age or obsolescence.

As a result of the study, Professor Jackson applied percentages to each kind of construction involved considering first cost, rate of depreciation, probable effects of changes in the art and the acts of municipal bodies, special misfortunes due to the elements and any salvage that might be recovered from discarded plant. A figure of 7.3 per cent is reached in this way for the average yearly reconstruction account for the property, exclusive of land, general supplies and working capital, used in Massachusetts business, or $2,240,000 on the existing plant. It seems proved that the company is not building extensions out of annual receipts under color of the reconstruction account, and the exacting inspection of the plant shows that it is maintained in excellent condition.

The appraisal puts the board in possession of standards by which to measure the reasonableness of the total sum annually collected by the company from its subscribers, but fuller traffic data and apportioned cost records must be gathered and analyzed before

recommendations as to the company's relative treatment of localities and classes of customers can be put on a firmer foundation. There appears ground for an early revision of rates in Boston metropolitan and suburban districts. The great importance of a full and comprehensive telephone service and the large part which the telephone plays in the business welfare and social convenience of the State justify further expenditure for a traffic, rate and cost study. Improved methods of accounting are desirable to show more fully the effect of changes in the rates for any particular service.

Additional complexity is introduced into the rate question by the relations of the toll service to the local service. In the appraisal the two classes of plant were carefully separated, but further figures and more careful means of separating local and toll operating results are needed. Figures for gross receipts seem to indicate that at present the long-distance toll system is not earning its own operating expenses, reconstruction charges, and return on the investment.

The report concludes with a recommendation for a further appropriation to enable at least a year's study to be given to the traffic and rate problem in a way that shall serve to establish a sound basis upon which future rate problems may be adjudged. Within a short time it is expected that certain recommendations will be made as to the rates in the Boston and suburban districts as a direct result of the appraisal now completed.

Exhibit 1.—Inventory Showing Extent of Plant in Massachusetts.

Buildings owned by company	33
Parcels of land owned by company	54
Exchange central offices	247
Operators' positions at exchange switchboards	2,367
Length of pole lines (approximate), miles	3,837
Length of underground conduits—	
Feet	3,100,901
Miles	587
Underground ducts—	
Feet	14,370,649
Miles	2,271
Manholes in underground conduits	11,217
Aggregate length of pole lines and conduits, miles	4,424
Length of open wire on poles—	
Miles	67,599
Feet	5,264,160
Length of aerial cable, miles	997
Length of conductors in aerial cables, miles	66,836
Total length of overhead conductors—	
Miles	134,435
Feet	6,663,360
Length of underground cables—	
Miles	1,262
Feet	52,400
Length of submarine cables, miles	10
Length of conductors in underground and submarine cables, miles	318,225
Aggregate length of aerial, underground and submarine cables, miles	2,269
Aggregate length of telephone conductors in all cables and wire, miles	452,660
Number of poles	310,138
Number of subscribers' telephones on Aug. 31, 1908	199,382

Exhibit 2.—Appraisal of Property, Showing Value of Property Belonging to Business in Massachusetts.

Substation equipment	$3,217,240
Drop wires leading to subscribers' premises	688,315
Poles and fittings	4,260,173
Conduits and manholes	7,588,632
Wires on poles	2,724,017
Aerial cables	1,465,213
Underground and submarine cables	4,718,066
Switchboards	4,094,067
Furniture and tools	453,078
Land and buildings	2,344,469
*General supplies	1,040,000
†Net current assets and cash on hand	1,560,000
Total	$34,133,270

*Book value, from auditor.
†Round figure, representing average condition.

Exhibit 3.—Appraisal, Showing Value of Property Belonging to Business Outside of Massachusetts.

Apparatus and equipment	$9,771,766
Land and buildings	210,783
*Investment in other companies	1,945,000
†Net current assets and cash on hand	480,000
Total	$12,407,549

*At cost value, from auditor.
†Round figure, representing average condition.

Exhibit 4.—Appraisal, Showing Division of Property Value Between that in Massachusetts and that of Adjoining States, Together with the Total Value of Property.

Value of property in Massachusetts	$34,133,270
Value of property adjoining Massachusetts	12,407,549
Value of entire property of the New England Telephone & Telegraph Company	$46,540,819

Exhibit 5.—Appraisal, Showing Value of Property Compared with Outstanding Securities of Telephone Company.

Appraisal value of entire property of New England Telephone & Telegraph Company	$46,540,819
Total par value of the company's outstanding stocks, bonds and notes, as given by the company's auditor for Aug. 31, 1909	38,939,850

The Budapest News-Telephone

In reply to a Missouri inquiry in regard to the Budapest news-telephone system, Consul-General Paul Nash writes as follows in the Daily Consular Reports:

"This system, which has been in successful operation in the capital of Hungary for several years past, is owned and managed by a private corporation, whereas the regular telephone system is owned by the Government and administered by the ministry of posts and telegraphs. The annual subscription, $7.31, paid quarterly in advance, entitles the subscriber to two receivers and the full service of news, music, etc., the subscriber to pay the expenses of installation and removal, generally about $8.50. The service begins at 8:55 a. m., when a buzzing noise, loud enough to be heard across a large room and lasting for fifteen seconds, announces the correct time. At 9:30 the day's programme of important events is announced; that is to say, the ceremonies, lectures, plays, races, etc. At 10 and 11 o'clock stock quotations and general news items are given.

"At noon comes a second announcement of the correct time, followed by parliamentary news and general items of interest. At 12:45 stock quotations from the local, Vienna, and Berlin exchanges and general news. At 2 o'clock more parliamentary and general news, and at 3 p. m. the closing prices of stocks, meteorological forecast, local personals and small items, and in winter the condition of the various skating places. At 4 p. m. court and miscellaneous news. From 4:30 to 6:30 military music from one of the great cafes or gardens. In the evening the subscriber may choose between the royal opera or one of the theaters, and later music by one of the tzigane orchestras.

"This programme is sufficiently varied to satisfy the desires of all classes of subscribers, and in general the service seems to give the utmost satisfaction. Its advantages are so manifest that no comment appears necessary."

Who's Who in the Telephone Game

HE was born under the twelfth sign of the zodiac. The symbol is a whale or two and so is he when it comes to achievement. He was also born at Cambridge in the very shadow of Harvard—environment that has always been respected. His nativity was on the 14th day of the month and the year was 1861.

About the time the telephone was invented, John Joseph Carty entered the service of the Bell Telephone Company. The company has kept him so busy ever since that he has not had time to look for anything else to do and as a consequence he has to his credit twenty-nine years of continuous service—always with the same indicia—by which token is meant the Bell that is blue.

If Carty was ever a boy, with the habits of other boys, the historian has failed to point out any extraordinary developments; but shortly after he became associated with the old Telephone Dispatch Company at Boston, he began contributing to the art of telephony in such an unusual manner, that he must have differed from all other boys, before or since. These contributions were of such splendid value that they have become permanent, fundamental, basic principles which will endure long after Carty has passed beyond.

For the Past Two Years this Modest and Ultra-Conservative John Has Been Chief Engineer of the American Telephone and Telegraph Company.

It was in Boston, under Carty's direction, that the first multiple switchboard was installed. At that time it was the largest switchboard installation ever attempted. It was also the first metallic circuit multiple switchboard to go into active service. Some of the principal features of the old Boston board are in all of the modern express type of boards of today. Nor could any other thing be offered which would better illustrate the characteristics of John Carty. When he puts his O. K. on a job, that particular job has been completed to a fare-you-well.

And as it was then, it is today, for of all men now living, Carty is called upon to decide questions involving tremendous interests, with responsibilities far greater than those of any other telephone man in the world.

More than twenty years ago Mr. Carty took charge of the cable department of the Western Electric Company, having to do with the eastern territory. His headquarters were in New York and in this new capacity he studied manufacture of cable which resulted in introducing a number of needed reforms. He had charge of all the important cable-laying projects which were required at that time in the large eastern cities. It was not long afterwards until he assumed the position, also for the same territory and for the same company, as department manager of switchboards. Under his direction all of the large eastern switchboards were installed, among which was the original New York Cortlandt Street multiple board. It was during this activity that Mr. Carty revolutionized switchboard construction. What he did has since become standard switchboard practice.

John Joseph Carty was first to demonstrate how two or more telephone circuits connected directly with the common battery could be operated. In 1888 common battery systems for central offices were installed. From these early experiments has grown the standard common battery system as it exists all over the world today.

It is difficult to conceive how a man who is responsible for the development of serious practical engineering problems could find time to give his natural inclinations any consideration, but Mr. Carty has found such time and devoted a lot of it to original research. He has made exhaustive investigation into the nature of the disturbances to which telephone lines are subjected. It was in this work that he developed his title as a contributor to pure science. The first public account of this work is a paper entitled "A New View of Telephone Induction." This was read before the Electric Club, Nov. 21, 1889. It has become a classic in telephone literature.

As usual, Carty's views were revolutionary, but engineers and experimenters in this country and in Europe were obliged to accept his statements universally and the paper still stands as the court of first and last resort for all operations on every phase of the subject. In this paper he showed the overwhelming preponderance of electrostatic induction as a factor in producing cross-talk. He proved that there is in a telephone line a particular point in the circuit at which, if a telephone is inserted, no cross-talk exists. He gave directions for determining this silent or neutral point and described his original experiments which showed how to distinguish between the electrostatic and electromagnetic induction in telephone lines.

On the 17th of March, two years later, Mr. Carty made additional contributions to the knowledge of the same subject in a paper which he read before the American Institute of Electrical Engineers. This was entitled, "Inductive Disturbances in Telephone Circuits." In this paper it was made known for the first time why twisting and transposing telephone lines renders them free from inductive disturbances. Here again Carty contributed to the fundamental theory of standard practice, but he had formed the habit and couldn't help it.

In 1889 he entered the service of the Metropolitan Telephone & Telegraph Company, out of which has come

the New York Telephone Company. His mission was to organize all of the technical departments. Coincident with the work was the mere bagatelle of reconstructing the entire plant of the company, converting it from grounded circuits and series switchboards to metallic circuits underground and new bridging switchboards.

With this work Carty began to find the real joy of living. It was a monstrous undertaking for any one man—a whale of a job—but the work was in keeping with the zodiac symbol. In proceeding with the undertaking, he selected and trained a large staff of young men fresh from college, many of whom have since attained positions prominent in the telephone field. And if John Joseph Carty has a hobby in which he takes particular pride, it is in the development of the personnel of his numerous departments. He is constantly looking to the welfare of those already engaged, but through his touch with prominent technical educators he constantly adds to his staff from the graduate classes of leading technical schools.

In the evolution of things, he became the chief engineer of the New York Telephone Company.

Carty has had time to do some inventing. These inventions have always been primary in their character and possibly the most important is known as the Carty bridging bell patent. In absolute harmony with the Carty method, this bridging bell offered another sudden and complete revolution in telephonic affairs. Carty had something to say on the subject at the Detroit convention in 1890 and from the day the address was delivered telephone engineers throughout the country began the work of removing series bells and replacing them with those of the bridging type. No improvement having to do with the party line service can be compared with the advent of the bridging bell.

Mr. Carty is not a large man in stature, but what he lacks in weight is made up in energy—an indominate, constant force, ever alert. Characteristically striking is his ability to eliminate the small factors in every large problem. Intuitively he puts his finger with absolute certainty upon the vital spot. He sweeps aside the large mass of confusing detail and goes straight to the heart of his problem. His bestowments to telephone literature bear out this method of his attack. His logic is always as unassailable as it is clear and concise. And the added charm is the beauty of its diction.

For the past two years this modest and ultra-conservative John has been chief engineer of the American Telephone & Telegraph Company. His residence is in Short Hills, New Jersey.

Report of Nebraska Railway Commission

The first report of the Nebraska State Railway Commission indicates that in Nebraska 208 telephone companies were doing business on June 30, 1908, the number being somewhat increased since then. Of these fifty-two had a capital in excess of $25,000 each, while 156 had a capital ranging from that sum down to $2,000. Stockholders in the companies numbered 13,253 and there were 2,619 employes on the pay rolls.

Of subscribers living on farms there were 54,338, indicating that conversation between rural residents can be carried on from farm to farm with as much celerity, and almost as generally, as in the thickly populated city. Of city subscribers there were 36,917, or 17,421 less than the number taking telephone service on the farms of Nebraska. Of course, the larger number credited to farms cover a tremendous extent of territory. In all, there were 125,209 telephone installed at the date mentioned. Of this number Omaha had 42,937.

The fifty-two companies with the higher capitalization represented an investment of $9,747,353 for construction and $10,858,439 for plants, buildings, cash and all other assets, a total of $20,605,792 as carried on the books of the companies.

The 156 companies with the smaller capitalization gave the book cost of construction as $1,388,771. Some of these companies do not furnish telephones, the subscribers owning their own instruments and paying switching charges. In other cases individuals own the switches.

Gross earnings for the year of the fifty-two larger companies amounted to $2,401,896, while operating expenses were set down at $1,798,427. Dividends on stock and interest was paid to the amount of $483,219 by thirty-seven of the fifty-two larger companies. Dividends on stock and interest was paid by the Nebraska Telephone Company to the amount of $292,085, and by the Lincoln company to the amount of $38,797.

The San Francisco Fire System

Plans for the most comprehensive system of fire protection ever proposed for an American city have been approved by the San Francisco Board of Supervisors, and the work of carrying them out, at an expense estimated at $5,250,000, has begun.

The plan for the fire telephone system provides for 360 instruments for the exclusive use of the fire department. There will be six call boxes on each circuit, and the circuits will be so arranged that those in areas of made ground can go out of service without affecting any of the other circuits. The call boxes will be provided with connections for portable instruments to be carried by the officers of the department, and will be so located that at least one will be within convenient distance of any part of the protected districts, the distance from any hydrant to the nearest box not exceeding one block. All the telephone wires will be underground.

If the officer in charge at a fire desires the water pressure increased, he will be able to telephone to the gateman at one of the reservoirs, who, by operating gates controlled by hydraulic pressure, will be able to connect the mains of the lower zone directly with the mains of the upper zone, and so on till the needed pressure is obtained.

Havana Company Gets Government Lease

The Havana Telephone Company, whose contract with the government of Cuba expires next year, has surrendered its right under this contract and has obtained a lease from the government for eighteen years, the company to pay the government $24,375 a year for the first two years and $150,000 for each of the remaining years. This arrangement is made by a presidential decree.

Illinois Telephone Bill Passed

The Illinois State Senate has passed a bill amending the act in relation to the powers, duties, and property of telephone companies to provide that they may acquire by lease or purchase the lines, exchanges, franchise rights and other property of other telephone companies; may dispose of their own property to other companies, and may hold stock and bonds of other companies.

Some Questions Answered

By J. C. Kelsey

[This department is at the command of our readers. Questions relating to all branches of telephony—technical, financial, ethical, or otherwise—are invited, and will be answered in the order received. Names of inquirers will not be used unless desired.—*Editors.*]

In our contention for a higher rate, the municipality insists upon valuing our property strictly upon a basis of its present actual physical value. The facts are these: Our company paid $40,000 for this plant, and we soon found it necessary to rebuild. This was done at a cost of $85,000, and 1,400 subscribers are served.

On our side, we insist upon a return on $125,000, the total amount we have put into the plant. Are we right, and if not, why not?—C. H. A., Missouri.

If your case were in Oklahoma, the contention of the municipality would be correct, since the constitution of that state only takes cognizance of actual physical value. Constitution or no constitution, it seems to me that it all depends upon conditions of present and past income.

In Kansas City, Missouri, the street railway interests are setting up the usual cry for a 50-year franchise, since their average 25 or 30-year grant shows signs of senility. They are insisting upon a capitalization of $33,000,000. This includes all the money spent for original horse and car barns and tracks and even money spent for horse feed. All the money spent for the succeeding cable lines, and finally the ultimate electrification. In other wards, they adopt your contention—they want to eat the cake and have it too. They want to capitalize every bit of reconstruction ever done.

Of course, the citizens are divided and distracted, trying to solve some of the problems left untouched by the eminent Mason and polygamist, King Solomon. He could determine the ownership of a baby but he laid down no precedents for modern municipal tangles.

Naturally the people of Kansas City want the trolley systems upon a real physical value basis, because they expect to adopt the Chicago plan of allowing the city 55 per cent of the net receipts.

Suppose a man and his wife build a house costing $2,000. As the children grow, a new house is built, and the old one torn down. The new house cost $10,000. Suppose all of their investments were happy ones, and a social position was desired. Accordingly, the house was removed and a new $30,000 home was built.

Suppose the man wanted to sell and $30,000 was a fair value. Would you think the man was fair if he wanted $30,000 plus $10,000 plus $2,000, or $42,000? You may be sure you would not pay $42,000, the real value being but $30,000.

* * *

Now, here is the Kansas City case. A horse car line was built. It became too small. The city grew swiftly. The cars could not carry the people, and the distances grew too great to carry what few it served in any decent time.

So the cable line was laid, and cable cars fully served the people with speed and space. The cable line was built, not from a sense of philanthropy, but for the purpose of making more money. And they did make money, too.

Finally, the company saw the handwriting on the wall, and dropped the cable for the last time. The trolley line took the place of the cable, and made the company more money. Here again was justifiable reconstruction—in fact, reconstruction doubly justified because operating costs were reduced, certain maintenance charges forgotten and chances for interrupted service materially lessened.

So, like the owner of the house, the owner of the trolley interests wants pay for all the former construction, now obsolete.

* * *

Reconstruction is not a capital account. Sometimes it is justifiable, as when you buy an old plant with the expectation of improving it. It is capital account only when your company has served the people at a rate so low and inadequate that you could not maintain a renewal reserve or a reconstruction account.

In the street car case, such a condition is not true. The cost of carrying passengers there is low, and the fares are on a full five-cent basis. There was enough in the way of receipts to maintain great renewal reserves and anticipate any change in the art. But instead, they capitalized all the earnings, which means watered stock, and water turned in, not by buckets, but by hydrants. In other words, the renewal reserve fund was earned but diverted.

In your case, your rates were so low that you could barely live, much less create a renewal reserve fund. Consequently, the people owe it to you. You cannot collect it. You can only add it to your capital account and thereby charge the people interest upon it.

Had the trolley companies carried people for three cents, or ten tickets for a quarter, then they might be justified in carrying $33,000,000 into their capital account.

Did you think of it? This $33,000,000 capitalization means that each man, woman and child of that city is capitalized at nearly $200. Surely they expect much travel in that town.

If you look back over the history of the plant you have bought, and count the number of years, and the number of telephones in service, and should you multiply the number of station years by $4, I will wager that you would have found $40,000 in the old war chest or renewal reserve fund. Your old plant could then have been scrapped and cheerfully charged off.

But the facts are that your subscribers got $4 worth of service every year that they did not pay you for. So you are justified in adding it to your capital account.

Your new plant must have a rate which will let you maintain not only a sufficient renewal fund, but interest upon that old depreciation debt, and upon the money newly invested in the plant.

Of course, you will have to prove that your rates were insufficient in the past. It should not be hard to do. You cannot blame the people for neglecting to pay the extra $4 per year when you did not ask them to do so.

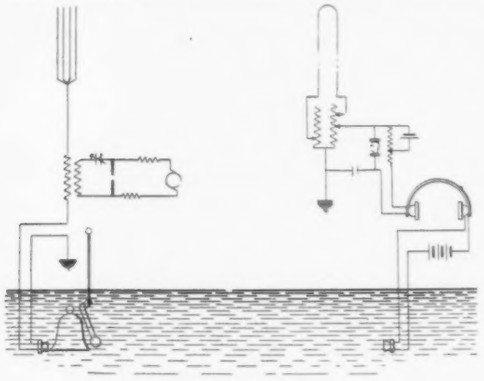
I am afraid that there has been too much optimism in the past, and that some have too pessemistic view of the future. The future looks good to me.

Recent Telephone Patents

By David S. Hulfish

It will be the purpose of this department to list all United States patents, as they are issued, which pertain to any branch of the telephone business, giving such data in each case as will enable the reader to judge whether he wishes to see the complete drawings and specifications of the patent. When patents of special interest to TELEPHONE ENGINEER readers are encountered, the descriptive matter herein will be amplified accordingly. A complete copy of drawings, specifications and claims of any patent listed will be furnished from this office upon receipt of ten cents.

913,528. Signaling System. Here we find the telephone used in two systems, neither of which is itself a telephone system. At the left in the illustration is a marine signaling station, while the apparatus at the right is assumed to be aboard

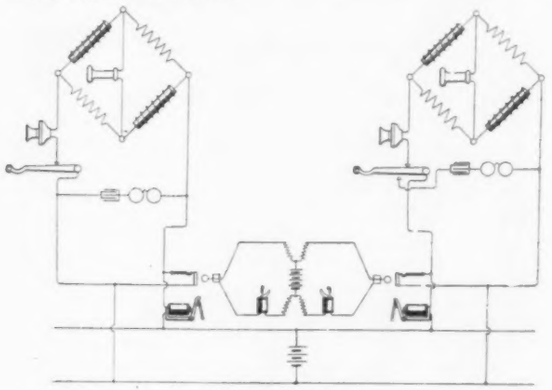


913,528.

ship. The operator on the ship is enabled to determine the distance of the ship from the signaling station by noting the difference in elapsed time between the receipt of the signal by wireless telephony and by sound propagation through the water, respectively. Robert H. Marriott, of Brooklyn, N. Y.

915,075. Signaling System. In this system, the central office line lamps, or line signals of whatever nature, are arranged in map-like plan, and the display of any signal serves not only to notify the central office that a particular line is calling, but it also locates geographically the source of the call. It is intended for police patrol work rather than for general telephone exchange switchboards. Nathaniel B. Cregier, of Chicago, Ill.

915,077. Desk Stand. Switches, induction coil and terminals are located in the base of the desk stand, and the switch hook lever is extended in bell-crank shape to carry a plunger into the base of the stand to operate the hook switch . W. W. Dean, of Chicago, Ill., assignor to Kellogg Switchboard & Supply Company, of same place.



Reissue 12,929.

915,079. Telephone Receiver. A projection is placed upon the receiver in such position that it may be pressed upon the skull of the user. It is designed to be of assistance to telephone users having impaired hearing. James Dixon, of Cleveland, Ohio.

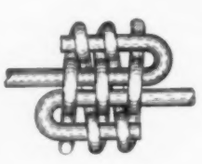
915,305. Telephone Pole. The pole is braced by a system of trusses. Eugene J. Newhall, of Waupaca, Wis.

915,330. Insulator. The wire is held in the insulator by its tension in the span. Jasper Blackburn, of St. Louis, Mo.

915,334. Ringer. This is a tuned or harmonic ringer of the Stromberg-Carlson type, having weighted armature ends for tuning purposes. Merritt S. Conner, of Rochester, New York, assignor to Stromberg-Carlson Telephone Manufacturing Company, of same place.

915,518. Attachment. A desk stand support is shown, and in connection therewith are devices for supporting the receiver and for making and breaking the circuits of the instrument by controlling the switch hook lever. Frank S. Weyrs, of Philadelphia, Pa.

915,578. Call Recorder. This is a device enabling any subscriber of a telephone system to record his own number upon the receiving device of any other telephone of the system, so that the called subscriber upon his return may see at a glance



916,653.

916,710.

915,578.

the directory numbers of the stations which have called for him during his absence. The style of the record produced is shown in the illustration. Hermann Fascher, of San Diego, Cal.

915,592. Waterproof Switchboard. Now that ocean-going vessels are equipped with telephone switchboards, and with intercommunicating switchboards and telephone sets placed in exposed positions about the ship, the weather-resisting switchboard must of necessity be developed to a satisfactory degree. In mine telephone systems, the requirements are similar, but less rigorous. Edward A. Graham, of Brockley, London, England, assignor to himself and Alfred Graham & Company, same place.

915,625. Attachment. An extension for the earpiece of a telephone receiver. The design is intended to assist telephone users who are hard of hearing. Alcorn Rector, of New York, N. Y., assignor to Rector Help-A-Phone Company, of same place.

916,117. Testing System. A busy-test system for common battery multiple switchboards. W. W. Dean, of Chicago, Ill., assignor to Kellogg Switchboard & Supply Company, of same place.

916,142. Combined Fire-Alarm Telegraph and Telephone System. Manious Garl, of Akron, Ohio.

916,235. Desk Stand. The switch is placed in the bottom of the stand and a system of levers extends from the hook lever to the switch. Alfred H. Weiss, of Evanston, Ill., assignor to Kellogg Switchboard & Supply Company, of Chicago, Ill.

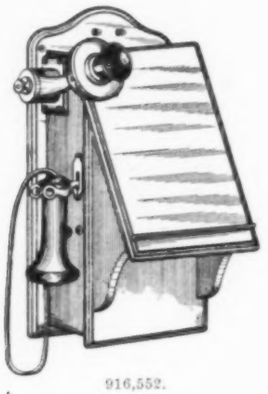
916,245. Attachment. This attachment offers a means for blocking the entrance of sound to the transmitter diaphragm whereby the telephone may be shut off from a conversation held in the room, if desired. Richard L. Woodward, of Jersey City, N. J.

Reissue 12,929. Telephone System. This is the patent of the well-known Dean substation circuit. The circuit drawing is reproduced as the illustration herewith. The receiver is placed as the current detector of a Wheatstone bridge arrangement which is balanced for direct currents, but unbalanced for rapidly alternating or oscillating currents. Ray H. Manson, of

Elyria, Ohio, assignor to Dean Electric Company, of same place.

916,458. Recording Apparatus. The object of this invention is the construction of an electromagnetic recording apparatus which will announce a call in the event of the absence of an attendant at the station signaled and to record sufficient information at that station to enable the attendant o ascertain later the identity of the station which called, as well as the time at which the call was made. Robert D. Lampson, New York, N. Y.

916,552. Telephone Set. A substation wall telphone set of novel design. See illustration. Rasmus Hansen, of Sioux City, Iowa, assignor of one-half to Interstate Supply Company of same place.



916,552.

916,653. Wire Connector. A connector for line wires, the connection itself being formed of the wire arranged to interlace with the line conductors. Arthur T. Ballenger of Wayne county, Indiana.

916,710. Switchboard attachment. A marking tag for placing in a line jack, to hold a card indexing information concerning the line. See illustration. Harry S. Janes, of Hannibal, Mo.

916,950. Transmitter. A plane split bridge is shown clamping the body of the carbon cell and the binding posts are held in a novel manner. Rasmus Hansen of Muskegon, Mich., assignor of one-half to Interstate Supply Company, Sioux City, Iowa.

917,017. Relay. A compound relay is shown. It consists of two relays having two armatures, all integrally built. The function of one armature is to close a contact, and the function of the second armature is to open the same contact. This is an arrangement for controlling the signal lamp circuit in a four-relay cord pair. William W. Dean, of Chicago, Ill., assignor to Kellogg Switchboard & Supply Company, of same place.

917,115. Toll Box. This is a coin collecting device for telephones, operating with a lever to produce an audible signal, and receiving several different sizes of coins. Walter T. Otto of Philadelphia, Pa., and Johnson R. Douglass of Atlantic City, N. J.

917,214. Ringer. An harmonic or tuned ringer has its armature suspended by an elastic rod which is attached at one end to the armature and at the other end to the heel place of the magnet spools. One of the objects is the provision of a ringer which will not hum when subjected to currents of a frequency near that at which it is designed to ring. Klas Weman, Buffalo, N. Y.

917,272. Dry Battery. Claude D. Enochs of La Crosse, Wis.

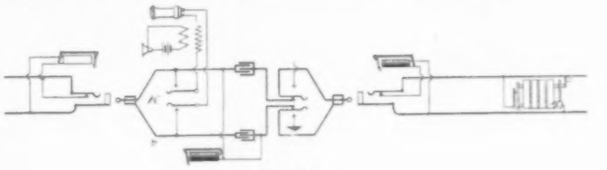
917,633. Transmitter. The carbon cell is supported independently of the sound receiving diaphragm, and is connected therewith by intermediate struts. Charles T. Mason, Sumter, S. C., assignor to the Sumter Manufacturing Company, of same place.

917,916. Selective System. In this system of stepping selection, a deeper notch in the ratchet wheel permits the selected station to close its relay contact to ring. Harris A. Watson, Kendallville, Ind.

918,127. Insulator. The top is split and the wire after being passed into its niche is held by a key member forced into notches. Walter G. Clark, New York, N. Y.

918,513. Panel Construction for Switchboards. Amos F. Dixon, New York, N. Y., assignor to Western Electric Company, of Chicago, Ill.

918,566. Magneto Clearing Circuit. By the combination of two condensers with the bridged clearing drop of a magneto cord pair, the drop is made responsive under conditions where ordinarily it would not be so, and ringing through to the distant connected line is prevented. Ray H. Manson, Elyria, Ohio, assignor to the Dean Electric Company, of same place.



918,566.

918,660. Intercommunicating System. The stations are equipped with push button selecting keys, and the improvements are principally in the circuits for trunking between a common battery intercommunicating system and a magneto exchange. Elmer R. Corwin, Chicago, Ill., assignor to Corwin Telephone Manufacturing Company, of same place.

918,682. Keyboard Signal. A magneto visual signal of novel construction is placed in the keyboard near the keys; it is tripped as a clearing signal to display its target, and is restored by the operation of the listening key. Oscar M. Leich, Rochester, N. Y., assignor to Stromberg-Carlson Telephone Manufacturing Company, of same place.

918,852. Selective System. Each station has series and bridged relays or magnets; a ground is created at the distant end of the line over which selection is made, during the process of making selection. Lockout features are provided. Ruben C. M. Hastings and Thurston Matheny, of Athens, Ohio.

918,866. Line System for Transmission. Isidor Kitsee, Philadelphia, Pa.

918,955. Selecting Switch. A mechanical part of a larger automatic telephone system, for selecting and connecting with a telephone line. Charles F. Bradburn, Delmar, Ontario, Canada.

919,069. Line Disconnector. The specific design is to mount upon the outer wall, with a push rod through the wall, a push upon the rod operating to disconnect the telephone from the line during storms. Jesse W. Pedigo, Chariton, Iowa.

919,113. Transmitter Controller. The object is to provide for a more powerful transmission over long distance lines than over the local connections. A transmitter having multiple or fractional parts which may be connected wholly or partially in series is shown. Charles Adams-Randall, New York, N. Y.

Reissue 12,943. Semi-Automatic System. Trunks are shown which really are the operator's connecting pairs. A calling subscriber connects with one of them automatically, and the operator, who has no cords, manipulates automatic calling devices, to cause the trunk to select and to connect with the desired line. Edmund Land, Grand Rapids, Mich., assignor to Milo G. Kellogg, of Chicago, Ill.

919,384. Telephone Switchboard Cable. William L. Runzel, Chicago, assignor to Runzel-Lenz Electric Manufacturing Company, of same place.

919,386. Insulator. A knob insulator of two separable parts having a plurality of grooves between; the holding screw binds the two parts together as well as mounts the insulator upon the wall. Ferdinand Schaub, Jersey City, N. J.

919,394. Telephone Jack Box. A jack is mounted in a weather-proof box, for outdoor connection for portable telephones terminated with a plug to fit. John B. Taylor and Walter S. Bralley, Schenectady, N. Y., assignors to General Electric Company.

919,491. Automatic Switch. The patent discloses a novel type of automatic selecting switch, and shows several ways in which it may be connected into a telephone system. Lawrence O. Surles, Atlanta, Ga.

919,519. Cut-out and Arrestor. In connection with a lightning arrestor for substation, a switch is provided for cutting off the telephone altogether. William E. Ashby, Chariton, Iowa.

919,662. Register. At the telephone sub-station is a manually operated registering device which is electromagnetically locked, and cannot be operated except with the consent of the central office. William O. Weissich, San Francisco, Cal.

Letters to the Editors

Editors Telephone Engineer: We have read with interest the article in the May issue of Telephone Engineer entitled "Extirpate the Bug."

From an operating standpoint, your position with reference to handling measured service calls seems to me to be quite impractical. To illustrate, there are hundreds of private branch exchanges connected with the various exchanges comprising the Chicago telephone system, and it would be impossible without very radically changing the engineering and mechanical features of the local switchboards, and very materially increasing the cost per operating call, to follow the local calls through the branch exchanges in the way that you think such calls should be supervised. In the handling of long distance line calls this necessary cost of supervision is taken care of and charged for, and it is necessary that this course be pursued, but in the hundreds of thousands of daily local calls it seems unnecessary and unreasonable to incorporate unnecessary expensive features, and features of the kind that you are advocating that from my standpoint are wholly impractical. It may be that the writer of the article has had personal experience as a telephone engineer, or telephone traffic man, but if this is a fact, it does not occur to me that he let anything appear in the article that would lead to that conclusion.

If you have any practical operating plan that will put your idea into operation without increasing the cost of service to the company, and, as a natural sequence, increasing the cost to the subscribers, then be good enough to give me the benefit of your operating and engineering plan.

We subscribe for the various electrical journals in the hope of getting suggestions and information that will be helpful, and you will permit me to suggest that every article that you publish editorially should be as a beacon light to guide others in the right path, rather than merely a complaint and criticism without suggesting or providing an adequate remedy, which remedy should be backed by practical knowledge and practical experience. Leland Hume.

Editors Telephone Engineer: I have read your editorial on prepayment service and private branch exchanges, with which you open the May issue. If your editorial is read with sufficient shallowness of thought, or with sufficient absence of thought, it might seem that you have made some arguments. These first impressions, however, vanish when we apply the simplest of logical processes, viz., that of reasoning by analogy.

The user of prepayment service receives no guarantee that his call will mean anything to him should it perchance encounter a private branch exchange, or, indeed, a direct line with a single telephone equipment at its substation end. For example, the calling patron wants connection with Local 22, Main 587, because he wants connection with a specific person. If that specific person be not there, but if the private branch exchange operator answers, information may be obtained from the operator concerning that person. If a one-station line had been called and an answer obtained from an office boy or stenographer, the condition analogous to the answering of the private branch operator would be set up. If your objective person be not in the office you cannot talk to him whether on private branch or direct line. In either case, if the attendant answer, information may be obtained whether private branch operator or direct-line office boy. The probability is that the private branch operator, being of higher intelligence and better training, will give you more information and give it more courteously than the office boy answering on the direct line. You get something for your nickel. You get all that the private branch operator can give. You get as much as, or more than, you would get if a direct line extended from the central switchboard to the desk of the party whom you desire. Yet in your editorial you do not complain that on a direct line you may be answered by a scrub woman on the night shift and still have to pay the nickel.

A toll call accepts the name of the party desired and is supervised to its destination, viz., the party called. The prospective remuneration to the telephone company is from ten cents to many dollars. A local call accepts only the directory number indicating the subscriber's premises. It is that subscriber's option whether that number shall indicate a single terminal or a private branch switchboard. The local call is supervised to its destination, viz., the premises but not the person, and the prospective remuneration for the smaller supervision is a smaller sum, viz., from two to five cents. It seems equitable.

In Chicago, in years gone by, a ten-cent local service was given from railway stations, hotels and any other stations where it was desired. For the prospective remuneration of ten cents the telephone company accepted a call for number and name and supervised it until the party of the called name was secured for the conversation. The City Council of Chicago has prohibited this class of service.

Your next to last paragraph makes two false statements. "The operator does not take the nickel until she hears the voice of the party called for." The Chicago operator will not accept any identification of the party called for, but merely of the station called for, and she takes the nickel when a voice from that station is heard, regardless of whether it is the party desired or otherwise. Again you state that the information can be had without cost "that the man in Aurora is in Chicago." The limit of information without charge is that the man is "Gone for the day." If you wish to know where he has gone, the operator will say politely, "I can connect you with his office, and perhaps they can tell you," and it costs the full toll service price to get this information over the toll line just as it does to get this information from the direct-line office boy or private branch operator.

In this case the prospective remuneration to the telephone company is more than five cents, yet you did not get much if anything for nothing.

The rate per message which the Chicago Telephone Company charges is determined fundamentally in this way: The total calls result uniformly in a certain percentage of calls for which a charge may be made. The total number of calls represent a determinable cost to the telephone company, and the price per call upon those calls for which charge may be made is sufficiently high to insure that the revenue from productive calls shall be sufficient to pay the expense of the total calls and leave a profit. If now, in accordance with your expressed desires, certain calls at present productive should be made free calls, viz., those from measured service instruments in which the parties called were not obtained, and if supervision were extended also as you suggest the total cost of the total calls would be increased by the increased supervision, and the percentage of calls for which charge may be made would be reduced by reason of the unproductiveness of calls producing revenue under the present rules. The result would be that a larger cost for the total calls must be divided by a smaller number of productive calls, resulting in a larger cost per productive call to the telephone company, and this probably would result in a larger price per productive call which the telephone company must charge to pay for all calls and have a profit remain. The ordinance of the city of Chicago prohibits the Chicago Telephone Company from giving a better service within the city limits at a higher price. Nor do you argue that the present rate for productive calls is too high, as a basis that more service may be demanded for the same price.

You should first show that two cents is too much for partial supervision (to the premises only) and *then* make argument that full supervision (to the party called) should be given for the two cents fee.

For your information the measured rate in Chicago may be recited as follows: For 1,200 calls per annum, $60, say two cents per chargeable call under partial supervision and $36 for line and instrument rental; for 2,400 calls per annum, $96, say two cents per chargeable call under partial supervision and $48 line and instrument rental; all calls over 2,400 in any year are straight two cents each, partial supervision.

Summary: The Chicago Telephone Company gives within the city limits a partial supervision at a price per call of two cents and up. It gives beyond the city limits a complete supervision at a price per call of ten cents and up. A special rate (say ten cents) for complete supervision upon a call within the city limits would be pleasing to the writer personally, and in his opinion would be a desirable addition to the service which the company now offers. The ordinance under which the company operate prohibits such a rate.—D. S. H.

Editors Telephone Engineer: I note with much interest your editorial on service conditions existing in Chicago involving private branch exchange connections. I think your stand is well taken, and while there may be many arguments that could be theoretically brought out by the telephone company in favor of present operating methods, I am of the belief that the company's rules are fundamentally wrong in charging for connections which are not made to destination.

In reviewing the entire matter, it seems to me that the responsibility for the private branch exchange, its design and oper-

ation, lies entirely with the telephone company. It was soon found when the art acquired a rapid growth that rates charged were prohibitive if three or four, let us say, direct lines were required by a single individual or firm. To reduce this number of direct lines, thus enabling an individual or firm to have service at reasonable rates, the private branch exchange board and system was evolved. It would seem, then, that if the telephone company was responsible for the present conditions, that it should willingly do all in its power to give the proper kind of service over such private branch exchange lines, regardless of operating costs. The company has been reimbursed by the revenue which these exchanges have produced to such an extent that no operating cost in excess of present conditions could ever equal the increase in revenue. Therefore, it would seem that the conditions of which you complain should be remedied on this basis, if on no other.

As I understand the matter, the complaint refers only to measured service lines. Let us see what the ordinary conditions of operating are over measured service lines. The subscriber makes a call, and we will assume that the party called does not answer say for half a minute. During this interval, the operator is constantly cutting in on the line in a supervisory capacity to ascertain if the calling party had obtained his connection. Thus it would seem that the operating cost per call for measured service is directly due to the amount of supervision necessary by the operator, which in turn is directly proportionate to the length of time consumed by the called party in answering his telephone. This is a condition over which the telephone company has no control, and, therefore, it makes no complaint regarding it.

Now let us see what the operating conditions are in the case of a private branch exchange. The called party is not at the number that is given to the exchange operator, but at a local number from the private branch exchange board. The time factor involved in private branch exchange operation in answering calls, is very much less than that for individual lines as an operator is employed especially for this purpose. The time factor for the extension from the private branch exchange is possibly as great as for the individual lines. Therefore, it is only reasonable to admit that there is an increased time factor requiring supervision on all private branch exchange calls if the telephone company's operator was required to supervise the connection until the extension from the private branch exchange had answered.

The all-important question then seems to be one involving this additional time factor, which is introduced by the answering of the private branch exchange operator and the connection necessary to the extension. It strikes me, from the knowledge that I have of operating conditions, that this is an entirely negligible quantity considering the ratio of private branch exchanges and measured service lines to the entire exchange system, and that the loss incurred by the telephone company for thus supervising connections could not be estimated in dollars and cents, so fine would be the division of time upon which would be computed the additional cost of operating. It therefore seems from two standpoints, that the telephone company can and should supervise all connections on measured service lines to the actual destination of the call.

We now come to the vital point governing this situation. A glance at the Chicago Telephone Company's directory shows that in a great many instances private branch exchanges are listed as a number; under which the various departments which are connected to this private branch exchange are also listed. Under the present methods of operating, we now have this condition: I, who have a measured service telephone, am calling as an objective point an extension from a private branch exchange switchboard, which is listed in the telephone company's directory, and I am charged for a call as soon as the private branch exchange operator answers, regardless of whether I get the party listed by the telephone company or not. I am charged, therefore, for something which it agrees to furnish, but does not, as one can only assume that the company agrees to give connections to all points which it lists. Supposing that the extension of this private branch exchange, which I call, is a busy one, and I am forced to call five consecutive times in order to get an answer, I am charged for five calls for which I have no results, but which the telephone company is obligated to procure for me because it lists the connection in the directory.

The argument may be brought up that there is no law against a subscriber holding a line until the extension is ready for connection; but this is not a fair contention, for the telephone company does not delegate an operator on straight line connections to hold her cord up until the called party is free for connection. The same condition is true of a busy man; he can not afford to waste time in holding a receiver for connections. It seems to me that the whole system is wrong, because of the fact that the subscriber on measured service lines is required to pay for something which he does not get.—M. E. D.

Of Interest to the Trade

The Paragon Never-Slip Messenger Support

The accompanying cuts illustrate the latest invention of S. D. Levings, who is assistant engineer to Kempster B. Miller. Mr. Levings has assigned this device to Frank W. Pardee, manufacturer of the Paragon specialties, and it will be known to the trade as the Paragon never-slip messenger support. The application of the device is clearly shown.

The principal features of the Paragon support are the separate clamping effect afforded by the machine bolt and its adaptability for installation by means of a ⅜ inch by 5 inch lag screw, for suspending strand carrying cables up to two hundred pairs capacity.

The separate clamping effect eliminates the trouble which is frequently found in the aerial cable plant caused by the riding of the messenger through the supports, thus straining the cable at the end terminal as well as at intermediate points along the lead. Particular attention has been paid to the design so that the clamp may be screwed to the pole by means of a lag screw, in place of the through bolt which is commonly used with other types of supports. That the boring of a hole entirely through the pole weakens it is a self-evident fact, and this hazard was the prime cause for substituting a lag screw.

The Paragon messenger support does not weaken the pole in the slightest degree, due to the fact that it uses only one lag screw, with a minimum of damage to the pole.

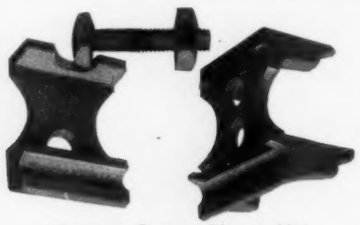
Some messenger supports have only one lag screw or bolt, which is used both to hold the support to the pole and also to clamp the strand or messenger wire. The Paragon uses one lag screw to fasten the support

Messenger Support Installed.

to the pole, but the messenger is clamped by an entirely different means, as can readily be seen from the illustration. The four teeth of this support bite into the pole and absolutely prevent the support from being twisted around on the pole. These teeth also act

as legs to support the messenger and keep the cable away from the pole.

The device is made of heavy malleable castings, thoroughly galvanized by the hot process, and bolts and nuts are also galvanized. The device is simple and efficient and is, it is said, very reasonable in price.



Messenger Support Disassembled.

The support has been in use for some time and very favorable reports have been received concerning its features. It is made in but one size, but is adapted to the suspension of No. 4 steel messenger, ⅜-inch or ½-inch strand, the clamping slot being modified for the three sizes. Prices and descriptive circulars can be obtained from Frank W. Pardee, manufacturer, 46 Fifth avenue, Chicago.

Intercommunicating Telephones

The increasing demand for intercommunicating telephone service throughout the country has induced the Western Electric Company to place on the market two types of metal automatic intercommunicating telephone equipment. These sets are made in two types, a non-flush set for mounting on a wall, and a flush set for mounting in a wall. All apparatus is compactly mounted in a fireproof iron case, having a hard, durable, black japanned finish with nickel trimmings. Owing to the attractive

Fig. 1. Flush Set.

appearance of this set, it is in keeping with the furnishings of any room.

The non-flush wall set has all the telephone apparatus mounted on a door, which is hinged at the bottom so it can be swung down as in Fig. 2. To make the apparatus accessible for maintenance and inspection, all current carrying parts, including the transmitter, are insulated from the case, and a concealed binding post receiver is used. A special feature of this set is the dust-proof slide used in connection with the switch hook to prevent dust from entering the case through the switch hook slot.

The flush wall set, Figs. 3 and 4, possesses all the features of the non-flush type, and in addition, the front of the set is removable from the back, this permitting the back of the set to be used as an outlet box. This set may

Fig. 2. Non-flush Set.

be placed in a residence or building while the building is under construction, or in an old building before the wiring working parts, fastened in place when convenient. The is started, and the front of the set containing all the advantages of this feature will appeal to contractors, and those installing sets in old or new buildings.

The superintendent's call equipment can be furnished for any of the stations, to enable a general call being given throughout the system for the superintendent, who may be in one or another of the departments.

Either full metallic or common return wiring may be used to connect the stations together. The former renders the system less subject to inductive disturbances and cross talk, and this is to be recommended especially if the system is to be connected to an exchange or outside service. If the maximum distance between any two stations

Fig. 3. Non-flush Set Open.

is 500 feet or less, the ringing battery should have a potential of about four volts, and the talking battery about four volts. With 1,200 feet as a maximum distance, potential of the ringing battery should be five volts, and of

the talking battery four volts. With 2,000 feet as the maximum distance the ringing battery should have a potential of seven volts, and the talking battery of six volts.

These sets have a capacity of twelve stations, each

Fig. 4. Flush Set Open.

set being provided with twelve buttons, one button for each station, and the name plate is provided with space opposite each button for designating the name or location of the station associated with the button. The same button is used both for signaling the station desired, and for establishing telephone connection.

On the Canal Zone

"On the Canal Zone" is a cloth bound book of 152 pages with 170 half-tone illustrations and an insert map of the canal zone, by Thomas Graham Grier. Price post-paid $1.00. For sale by A. C. McClurg & Company, Chicago.

The author of this book is a dealer in electrical supplies. He has been engaged in his chosen work for twenty-five years and during that time he has established an irreproachable record of integrity. Men who have dealt with Thomas G. Grier have every good reason to continue as patrons. It has never been part of Mr. Grier's labor to write books, but in an unguarded moment he saw fit to make a visit to the isthmus of Panama. His interest in the isthmus canal is, love for travel; his wish for the truth prompted the personal investigation.

Mr. Grier sailed from New York, February 15, 1908. His steamer reached Cristobal at 9:30 a. m. February 21. While he was in the canal zone, he wrote letters to his friends describing those things which were of most interest to him. He had with him a camera and with it he secured nearly half of the total number of illustrations which adorn the pages of his book. From other interested friends with cameras he added to his own stock of pictures.

The author makes no claim for the literary ability displayed in the volume, but it is written in such clear and concise English that an unusual demand has followed. Persons who have more than passing concern for the great engineering work that is being done in the building of the Panama Canal will do well to purchase a copy of Mr. Grier's book. The illustrations alone are a picture story without words, but the real charm is in Mr. Grier's written impressions. "On the Canal Zone" is a sequel to all of the works that have ever been issued on the subject.

Western Electric Company's April Returns

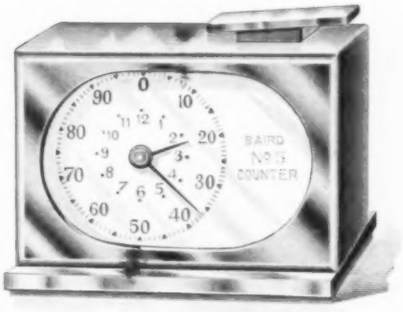
The returns of the Western Electric Company for April show an improvement over those of March, and are 50 per cent better than for April, 1908. The company is operating at an annual rate of 65 per cent of the record established in 1906, and fully 85 per cent of 1907. On the basis of April's showing the annual sales are running about $48,000,000.

Bell company sales are better than for a long time, and while there is no indication of an expansion movement such as took place in 1906, the telephone companies are good buyers of copper wire, telephone apparatus and line material. Copper, cables and poles are particularly active. The excellent demand for telephone apparatus from the agricultural districts shows no sign of decrease and the call for railroad telephone switching apparatus continues to gain, promising to become one of the most important branches of the company's operations.

Baird No. 5 Peg Counter

The accompanying illustration shows the new Baird No. 5 peg counter, a device recently brought out by the Baird Manufacturing Company, Chicago.

This counter has been designed to meet the need for an instrument to use in making peg counts, which



The New Baird Peg Counter.

can be used rapidly and can be set on a switchboard. The hands can be set back to zero instantly.

The device is covered by a guarantee as to its reliability and durability, and is meeting with great demand among telephone men.

A New Book

CONVERSATIONS ON ELECTRICITY, by Joseph G. Branch, is a book which may be read with benefit by everyone interested in electrical matters. It is an elementary work, and the somewhat difficult subject of electrical principles is treated with such clarity and so simple a manner as to be readily grasped at the first reading, even by those who have no previous knowledge of electricity. Scientific books are usually dry reading to beginners, but this work is made interesting and even entertaining by its conversational style.

The book is attractively printed, and its nearly 300

pages of text are plentifully illustrated with excellent engravings, whose simplicity and clearness aid greatly in the explanation of electricity's properties.

The volume is a 12mo., in green cloth covers, and sells for $2.

The Bell Telephone is the title of a volume printed and issued by the American Bell Telephone Company, Boston, and containing the deposition of Alexander Graham Bell in the suit brought by the United States to annul the Bell patents. The book contains 469 pages, covering the depositions and reprinting the Bell patents in full. It has been printed by the company because of its great historical value and scientific interest, and makes a valuable addition to any library.

About Ourselves

Harking back six months, the prophets told us there wasn't any excuse for starting Telephone Engineer. We were warned that the telephone press was a natural monopoly—two advertising bills were a nuisance, etc., etc., and that a publication which would accept the patronage of certain houses would be a menace.

Some of the remarks from the throne rooms would look bad in print, but they smoulder well in a pigeon hole. We have the lid on a lot of such stuff and here's hoping it will never require a lid-lifting.

Telephone Engineer has arrived! It is a restful exclamation. There is a goodly amount of advertising patronage in this last number of the first volume—a wholesome array of good will, and a host of paid subscribers. As far as these subscription orders go, they are the blue ribbon aggregation of the business—the men who are broad enough to discriminate. Incidentally they are the men who do the big things. Not wanting to miss anything, they fear to lose something that might possibly be printed in Telephone Engineer. So they subscribe, as all good telephone men should.

To those who have joined forces with us we send greetings. To others who are interestedly watching our progress, we invite co-operation. There is room for Telephone Engineer—no doubt about that. We feel sure there is, because we have moved three times in six months, always to larger quarters!

Sumter Company Expanding

The Sumter Telephone Manufacturing Company, Sumter, South Carolina, is doing a very big business and during the past six months the orders have increased to such an extent that it has been found necessary to build another large addition to its large plant, which now covers over 400,000 square feet of space.

Orders are now in for telephones for shipments to all portions of the United States, the Philippine Islands and to South America.

New Chicago Telephone Exchange

The new exchange building to be built immediately by the Chicago Telephone Company at a cost of nearly $500,000, including $95,000 for the site, will be the largest in Chicago, and capable of accommodating 40,000 to 50,000 telephones. Its location will be 78-82 Federal street, formerly Custom House place. It will be completed within a year.

New Automatic Contracts

Official announcement is made that the Automatic Electric Company has been awarded an important Cuban contract. The gross business to be done on the island in the next eighteen months is expected to reach at least $2,000,000.

The contract closed with the Cuban interests provides for changing over of all of the important cities of the republic from manual switch board telephone service to the automatic system. It is also provided that the city of Havana shall have at least 6,000 automatic telephones in service, and substituted for the old devices, by not later than September 1, 1909.

The company has also closed contracts for automatic installations at Helena, Montana, and Pocatello, Idaho, and is installing a 1,000 line increase at Columbus, Ohio, and a 500 line increase at Grand Rapids, Michigan.

Telephone Man Carries Fortune

E. C. Bradley, one of the managers of the Pacific Telegraph & Telephone Company, recently carried a fortune from San Francisco to J. P. Morgan & Co., in New York to avoid enormous express charges. Sixteen and one-half million dollars' worth of bonds of the Pacific Telegraph & Telephone Company had been purchased by the Morgan firm. The lowest rate made by the express company for their transfer across the continent was $15,000.

Mr. Bradley learned that he could charter a special train from his city to New York, obtain the services of two competent detectives and deliver the bonds personally at a reasonable sum, so, accompanied by Mrs. Bradley, two detectives and the train crew, he made the journey with his millions of securities.

A Duplex Memo

The Duplex Metals Company has distributed among its friends a pocket memorandum book of unique form. It is of the loose-leaf type, the ample leaves being bound by a handsome black seal leather cover. The merit of this arrangement becomes apparent when the supply of paper runs out, and the possessor of the book must remember Duplex if he would get more. "Copper Clad" tables are included with the book.

Camp Duct

Everyone having occasion to look into the matter of conduit construction should by all means secure copies of the H. B. Camp Company's catalog matter. The vast amount of information and the great number of instructive illustrations and diagrams make these publications necessary to telephone men.

The Phillips Catalog

The Phillips Insulated Wire Company's latest catalog, as a ready reference book on all wire data, is a pocket classic. It is leather covered, printed in colors, and contains information that makes it invaluable to the telephone and electrical trade.

Brevities of the Business.

PERSONAL NOTES.

Franz J. Dommerque, formerly secretary of the Kellogg Switchboard and Supply Company, Chicago, has been appointed consulting and contracting engineer for the Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y.

Robert H. Polk, general manager of the Memphis, Telephone Company, Memphis, Tenn., has assumed the position of consulting engineer for the Huntington interests which have in mind the rebuilding of the Citizens' Telephone Company's system at Houston, Tex.

F. T. Avery, Riverside, Cal., has been appointed manager of the Pacific Telephone and Telegraph Company's exchange at Escondido.

L. C. Ealy, Allegan, Mich., has been appointed manager of the Citizens' Telephone Exchange at Hopkins, Mich.

Max W. Ricker has been appointed manager of the Northwestern Telephone Company's exchange at Winona, Minn.

Miles Baldwin, Union City, Mich., has been appointed manager of the Michigan State Telephone Company's exchange at Albion, Mich.

B. Parsons, Valley City, N. D., has been appointed manager of the Griggs County Telephone Company, Cooperstown, N. D.

James R. Dodge, Ottawa, Ill., has been appointed manager of the Central Union Telephone Company's exchange at Mendota, Ill.

C. E. McCarn has been promoted to the position of chief engineer of the Colorado Telephone Company at Denver.

Theodore A. Gary, Macon, Mo., president of the Home Telephone Company of St. Joseph, and head of other independent lines in Missouri, has opened a branch office of the Theodore Gary Investment Company in St. Joseph, which will be in charge of W. H. Loomis, Jr., vice-president and general manager.

R. M. Merritt has resigned as New England manager of the Hoyt Electrical Instrument Works to become associated with the Wetmore-Savage Company, Boston. Mr. Merritt will be succeeded by E. W. Carter.

NEW TELEPHONE COMPANIES.

MARMADUKE, ARK.—Articles of incorporation have been filed for the Independent Rural Telephone Company, with a capital stock of $2,000. The officers are: President, T. R. Corley; vice-president, B. B. Stone; secretary, G. C. Meredith; treasurer, C. B. Ross.

RAU, ARK.—The Northern Arkansas and Missouri Telephone Company has been organized, with A. Winkle president, W. O. Fox secretary, and T. J. Davis treasurer.

MONTGOMERY, ALA.—The Montgomery and Crenshaw County Telephone Company has been incorporated for the purpose of establishing a telephone system throughout the state, and principally in Montgomery and Crenshaw counties.

RIVERSIDE, CAL.—The Corono Union Telephone Company has been incorporated with a capital stock of $25,000 by J. G. Jameson, E. J. Generaux, G. E. Snedecor and others.

BAKERSFIELD, CAL.—The Farmers' Mutual Telephone Company has been incorporated with a capital stock of $4,000 by W. W. Frazier, R. S. Ashe, D. Hirshfield, Milo G. McKee and James Herod.

GUNNISON, COLO.—The Gunnison County Co-operative Telephone Company has been incorporated with a capital stock of $50,000 by R. H. Andrews, W. A. Gillaspey, William Dalton and others.

GUYTON, GA.—The Effingham Telephone and Telegraph Company has been incorporated with a capital stock of $5,000, with privilege to increase it to $50,000. The incorporators are Sidney A. Newsom, Guyton; C. F. Berry, J. B. Simmons and J. B. Simmons of Springfield, and L. D. Kessler of Blanford.

CUTHBERT, GA.—Articles of incorporation have been filed by C. J. O'Farrell, J. G. Dean, and J. M. Bell for the Cotton Belt Telephone & Telegraph Company, with a capital stock of $21,000.

GAINESVILLE, GA.—Articles of incorporation have been filed for the War Hill Telephone Company by T. J. Brice, J. S. Clark, J. C. Cox and others.

POCATELLO, IDAHO.—The Idaho Independent Telephone Company has been organized by Thaddeus S. Lane, H. R. Risley, Frank R. Frost and others.

GRANGEVILLE, IDAHO.—The Whitebird Telephone Company has been organized to construct a line from Whitebird to Grangeville, where connection will be made with the Nez Perce Co-operative Telephone Company.

MIDDLECREEK, ILL.—Articles of incorporation have been filed for the Middlecreek Farmers' Telephone Company, with a capital stock of $2,500, by Scott Belknap, William H. Smith and Arch O. Galloway.

GOLDEN, ILL.—The Golden Farmers' Telephone Company has been incorporated by Philip Cain, Scott Taylor and D. G. Buss; capital stock $3,500.

LOVINGTON, ILL.—Articles of incorporation have been filed for the Farmers' and Merchants' Telephone Company of Moultrie county; capital stock $30,000; incorporators, William C. Neff, William O. Reed and Arthur E. Hanson.

STONE CHURCH, ILL.—The Northwestern Telephone Association has been incorporated with a capital stock of $840 by H. B. Doeschen, Louis Lammers and Victor Grattendick.

OTTAWA, ILL.—Articles of incorporation have been filed for the United Telephone Company, with the following officers: President, Vincent J. Duncan; vice-president, C. H. Rottger of Bloomington; secretary and treasurer, Al F. Seoch.

GEORGETOWN, IND.—The Georgetown Telephone Company has been incorporated with a capital stock of $10,000. The incorporators are A. P. Goodwin, J. F. Flyn, C. W. Harmon and others.

KOKOMO, IND.—The Stahl-Goyer Telephone Company has been incorporated with the following directors: Geo. A. Stahl, Chas. J. Stahl, Edward Hardebeck, Newton Keyton and Geo. Becker.

BRUSHY PRAIRIE, IND.—The Farmers' Mutual Telephone Company has been incorporated with the following directors: Arthur J. Hammond, E. W. Ernsberger and Fred Seaburn.

KOKOMO, IND.—Articles of incorporation have been filed for the John R. Goyer Telephone Company, with John R. Goyer, Joseph Hessler and O. A. Clark directors.

MOORE'S HILL, IND.—The Moore's Hill Telephone Company has been incorporated with a capital stock of $150, by M. C. Hulford, M. E. Bigney, S. J. Houston and others.

PORTLAND, IOWA.—The Portland and Cameron Telephone Company has been incorporated with a capital stock of $5,000 by F. N. Dunn, F. A. Hill and P. M. Johnson.

DYERSVILLE, IOWA.—The Lumemberg and Millville Telephone Company has been organized with the following officers: President, Otto Andreogg; vice-president, Peter Henkels; secretary-treasurer, George Friedman.

GUTHRIE CENTER, IOWA.—Articles of incorporation have been filed for the Bear Grove and Baker Mutual Telephone Company with a capital stock of $10,000. The officers are: President, William E. Lower; vice-president, Benjamin McLuen; secretary, Foster Rigley; treasurer, Frank Schaeffer of Casey, Iowa.

SALINE, IOWA.—The Saline Mutual Telephone Company has been incorporated.

LELAND, IOWA.—Articles of incorporation have been filed for the Leland Mutual Telephone Company, with a capital stock of $5,000; incorporators, E. G. McCreery and W. R. Buren.

IOWA FALLS, IOWA.—The Rural Home Telephone Company has been organized with Albert Brightwell president and Fred Havens secretary.

EDGEWOOD, IOWA.—The Edgewood Farmers' Telephone Company has been organized with the following officers: President, R. L. Phelps; vice-president, J. A. Stone; secretary, J. S. Wait; treasurer, U. G. Elliott. Capital stock $2,000.

BELLEVILLE, KANS.—The Belleville Telephone Company has been organized with the following officers: President, K. C. Murray; vice-president, T. A. Thornhill; treasurer, R. W. Winans; secretary, J. O. Thornhill.

MINA, KANS.—The Mina Telephone Company has been organized. The officers are as follows: President, L. B. Detweiler; secretary, William Burton; treasurer, Peter Godbout.

KEVIL, KY.—Articles of incorporation have been filed for the Kevil Independent Telephone Company with a capital stock of $1,000 by H. B. Link, H. A. Wyatt, J. D. Jerrett, J. M. Hill and others.

WELSH, LA.—The Planters' Telephone Company has been incorporated with the following officers: President, H. E. Wesson; vice-president, W. S. Gabbert; treasurer, E. C. Willard; secretary, John H. Cooper. Capital stock, $25,000.

LANSING, MICH.—Articles of incorporation have been filed for the Barryton Rural Telephone Company with a capital stock of $1,000.

FERGUS FALLS, MINN.—The Fergus Falls Rural Telephone Company has been organized by the farmers in this vicinity and the officers are: President, Max J. Kronnemn; secretary, George Kelley.

MENAHGA, MINN.—The Menahga Telephone Company has been incorporated with A. O. Richardson as secretary.

CHOKIO, MINN.—The Chokio Telephone Company has been incorporated with a capital stock of $2,000 by A. F. Reidner, Charles McAllen, James McNally and others.

PRESTON, MO.—The Preston Telephone Company has been organized with the following officers: President, L. J. Westerfield; vice-president, W. N. Parsons; secretary and treasurer, Thomas L. Cone.

KALISPELL, MONT.—The Flathead Telephone Company has been incorporated with a capital stock of $15,000 by B. Fox and others.

HINSDALE, MONT.—The Farmers' Telephone Company has been organized with a capital stock of $20,000.

THREE FORKS, MONT.—Articles of incorporation have been filed for the Three Forks Telephone Company with a capital stock of $2,500.

HAZARD, NEB.—The Hazard Telephone Company has been incorporated with a capital stock of $10,000 by C. W. Trumble, F. H. Fuller and others.

GLENVILLE, NEB.—Articles of incorporation have been filed for the Glenville and Inland Telephone Association with a capital stock of $10,000. The incorporators are J. R. Showcross, A. Batterman, H. B. Francisco and E. A. Holt.

ELIZABETH, N. J.—The Mutual District Telegraph and Messenger Company has been incorporated with a capital stock of $100,000 by Joseph A. McClary, Rahway, N. J.; George W. Blanchard and Henry W. Pope, New York, N. Y.; W. B. Moorehead, Elizabeth; H. L. Benedict, Union; E. K. Summerwell, East Orange.

CERES, N. Y.—The Kings Run Telephone Company has been incorporated by H. N. Hacket, H. J. Butler and C. C. Faulkner with a capital stock of $2,000.

ALBANY, N. Y.—The Public Service Telephone Company has been incorporated with a capital stock of $10,000,000, with the following directors: John A. L. Campbell, Robert F. Routh, Joseph P. Hauck, Russell H. Robbins, Albert J. Appel, all of New York City; William J. Ganzel of Carthage, N. J., and J. Keim Hetch, Brooklyn. It is the purpose of the company to construct telephone, telegraph and telautograph lines through the various towns and cities of this state and Canada.

RED CREEK, N. Y.—The Hawley Telephone Company has been incorporated with a capital stock of $500, with the following directors: Willis R. Younglove, William Hawley, Frank L. Mixer, Eugene A. Ford and Walter Mack.

SELMA, N. C.—Articles of incorporations have been filed for the Selma Telephone Company with a capital stock of $5,000. The incorporators are T. H. Atkinson, Washington, D. C.; L. H. Allred, Selma, and others.

HIGH POINT, N. C.—Articles of incorporation have been filed for the Prospect Telephone Company; capital stock $720. The incorporators are R. E. Mendenhall, J. B. Sink and others.

MANFRED, N. D.—The Manfred-Frahm Telephone Company has been incorporated with a capital stock of $10,000. The incorporators are John Fryer, K. C. Kapseng and others, of Harvey, and George Jensen, of Manfred.

MANDAN, N. D.—The Southern Morton County Telephone Company has been incorporated with a capital stock of $25,000 by P. B. Wickham, of Glen Ullin; W. F. Berrier, Flasher and William Simpson of Mandan.

MAX, N. C.—Articles of incorporation have been filed for the Pleasant Valley Farmers' Telephone Company with a capital stock of $50,000, by Peter D. Podhola, E. C. Jones, and others.

CLYDE, N. D.—The Clyde Mutual Telephone Company has been incorporated with a capital stock of $26,000, by J. H. Morgan, Gordon Brotherston, and others.

LINTON, N. D.—The Emmons County Telephone Company has been incorporated with a capital stock of $4,200, by F. E. Kaiser, H. C. Batzer, A. L. Geill, and others.

BURLINGTON, N. D.—Articles of incorporation have been filed by William J. Culver, Henry A. Parrie and Daniel Baker for the Burlington Farmers' Telephone Company; capital stock $25,000.

KULM, N. D.—The Swede Township Telephone Company has been incorporated with a capital stock of $5,000, by G. H. Davidson, Jacob Bjur, R. Ogren, and others.

Benton Ridge, Ohio.—The Mutual Telephone Company has been incorporated by M. F. Volweiler, and others.

Gilmore, Ohio.—The Farmers' Mutual Telephone Company has been incorporated with a capital stock of $2,000, by A. Parker, D. Gailbraith, and others.

Somerset, Ohio.—The Somerset Telephone Company has been incorporated with a capital stock of $25,000; incorporators, Edward Kibler, Robbins Hunter, and others.

Magnolia, Ohio.—The Farmers' Tri-County Telephone Company has been incorporated with a capital stock of $5,000 by R. R. Elson, J. H. Meitzer, M. J. Cooper, and others.

Ottoville, Ohio.—The Ottoville Telephone Company has been incorporated by J. C. Wannamcher, John J. Miller, and others; capital stock $5,000.

Port Williams, Ohio.—The Port Williams Telephone Company has been incorporated by J. D. Vandervoort, Albert Ellison, and others; capital stock $10,000.

Cadiz, Ohio.—Articles of incorporation have been filed for the Harrison and Jefferson Telephone Company, formed by the consolidation of the Harrison County Telephone Company and the Adena Exchange Telephone Company. The officers are as follows: President, W. P. Moore; vice-president, Charles F. Branson; secretary, J. F. Smith; treasurer, A. P. Sheriff.

Sayre, Ohio.—Articles of incorporation have been filed by J. W. Dodson, J. H. Henry, H. W. Dodson, John Reed, and S. H. Pettett; capital stock, $5,000.

Addington, Okla.—The Jefferson County Telephone Company has been incorporated with a capital stock of $1,500 by R. M. Golden, J. P. Garretson, and others.

McArthur, Ore.—The McArthur Telephone Company has been incorporated by Henry Black, John Rogers and C. H. Godfrey of Texmo and D. Stalford and B. H. Potterfield of Harmon.

Smithville, Okla.—A telephone company has been incorporated in this place by Mesdames N. O. Bryant, Ella Wright, Clare Bradley, Ely Rogan, Ardelia Bradley and Miss Florence Keiser, all of Oklahoma City, with a capital stock of $10,000.

Pinkston, Okla.—The Pinkston Telephone Company has been organized with the following officers: President, P. C. Kckenny; vice-president, A. L. Squire; secretary, O. V. Holloway; treasurer, Joseph Householder; capital stock, $2,500.

Whitehorse, Okla.—Articles of incorporation have been filed for the Whitehorse Telephone Company with a capital stock of $600. The directors are W. O. Douglas, M. E. Smith, L. D. Roming, H. B. Bosworth.

Fort Cobb, Okla.—The South Side Telephone Company has been incorporated by Stephen Ratcliffe, W. S. Keever and John Campbell.

Guthrie, Okla.—The Orchard Centre Telephone Company has been incorporated with a capital stock of $2,000; incorporators, William H. Thorn, Joseph Charvoz, Charles S. Choats, and others, of Guthrie.

Nixon, Okla.—C. S. Penfield, P. H. Tom and D. N. Campbell have organized the Nxion Telephone Company with a capital stock of $6,300.

Frederick, Okla.—The Tesca Telephone Company has been incorporated with a capital stock of $1,000. The incorporators are J. E. Smith, S. Dickey, S. Ellis, and others.

Pilot Rock, Ore.—The Independent Telephone Company of Pilot Rock has been incorporated with a capital stock of $3,000 by A. R. Turner, Frank Byrd, Fred Hascall, and others.

Marshfield, Ore.—Articles of incorporation have been filed for the North Coos River Telephone Company with a capital stock of $1,000 by John Hendrickson, James Landrith and Charles Mahaffy.

Selma, Ore.—The Deer Creek Valley Telephone Company has been incorporated with a capital stock of $1,500 by E. Hathaway, J. W. Baird, and T. H. Harmon.

Medford, Ore.—Articles of incorporation have been filed for the Citizens' Telephone Company; capital stock $30,000; incorporators, E. P. Pickel, and others.

Williamsport, Pa.—Application has been made for a charter for the Nippenose Telephone Company. The capital stock is placed at $15,000, and among those interested are the following: W. W. Zerby, J. J. Bower, and S. K. Woodring of Belfonte and N. E. Bobb of Harrisburg, the latter being treasurer of the company.

Meadow View, Pa.—The Rural Telephone Company has been incorporated with a capital stock of $5,000. The officers of the company are as follows: President, W. H. Giesler; vice-president, J. B. Greevee; secretary, G. H. Hayden of Abingdon; treasurer, J. W. M. Whitten, Abingdon.

Lancaster, Pa.—The Intercourse Telephone Company has been organized with a capital stock of $5,000. The officers are: President, W. J. Caldwell; vice-president, John M. Beam; secretary, H. M. Klingler.

Hallam, Pa.—The Hallam Rural Telephone Company has been organized with the following officers: President, F. R. Storer; vice-president, C. Shultzvach; secretary, L. A. Crumbling; treasurer, E. M. Strickler.

Wasta, S. D.—The Elm Springs and Wasta Telephone Company has been organized by R. E. Huddleston, John Asheim, and Dan Shine of Elm Springs; Frank Cottle of Smithville and Charles B. Hunt of Wasta, with a capital stock of $10,000.

Woodbury, Tenn.—The Home Telephone Company has been incorporated with a capital stock of $5,000 by Jesse Davenport, L. H. McCrary, and others.

Castalian Springs, Tenn.—Articles of incorporation have been filed for the Castalian Springs Home Telephone Company with a capital stock of $1,000. The incorporators are J. H. Schroulder, J. C. Corum, and others.

Auburn, Tenn.—The Home Telephone Company has been incorporated with a capital stock of $3,000 by B. R. McKnight, J. S. Odom, T. M. Bryan, and others.

Ivy Gap, Tenn.—The Ivy Gap Telephone Company has been incorporated with a capital stock of $4,000 by J. H. Davidson, E. S. Jackson, and others.

Charles City, Va.—The Charles City Telephone Company has been incorporated with the following officers: President, H. S. Saunders; treasurer, L. M. Nance; secretary, J. M. Bell.

Danville, Va.—The Danville Telephone Company has been incorporated with a capital stock of $5,000 by C. B. Flinttop, Danville, and others.

Bentonville, Va.—The Warren County Farmers' Mutual Telephone Company has been incorporated with a capital stock of $5,000, with the following officers: President, R. T. Morrisonville; secretary, R. A. Tristoe.

Grundy, Va.—The Grundy-Raven Telephone Company has been incorporated with a capital stock of $4,000. The officers are as follows: President, W. L. Dennis; secretary-treasurer, R. E. Williams.

Grundy, Va.—The Slate Telephone Company has been incorporated with a capital stock of $1,500. The officers are as follows: President, S. R. Hurley; secretary and treasurer, E. E. Smith.

Nashville, Tenn.—The Home Telephone Company has been incorporated with a capital stock of $2,000 to operate in Cannon and DeKalb counties. The incorporators are: W. R. Estes, T. B. Clark, and others.

New Middleton, Tenn.—Articles of incorporation have been filed for the Middleton Home Telephone Company with a capital stock of 1,000. The incorporators are W. H. Williams, R. M. Baird, and others.

Rogersville, Tenn.—The Rogersville Telephone and Telegraph Company has been incorporated with a capital stock of $5,000. The incorporators are W. D. Harmon, Geo. A. Smith, and others.

De Smet, S. D.—The De Smet-Mathews Telephone Company has been incorporated with a capital stock of $3,000. The directors are as follows: R. A. Rounseville, Luke Kelly, August Walstrom and Ole Johnson.

Cornhill, Tex.—The Cornhill and Gravis Telephone Company has been incorporated with a capital stock of $30,000. The incorporators are: T. A. Grumblers, V. A. Harville, and others.

Hinkley, Utah.—The West Side Telephone Company has been organized with the following officers: President, Thomas H. Pratt, Hinkley; vice-president, John Dewsnip, Hinkley; secretary-manager, W. B. Hamilton, Deseret; treasurer, Joseph W. Blake, Hinkley.

Isle La Motte, Vt.—The Isle La Motte Telephone Company has been incorporated with a capital stock of $5,000.

Ellerson, Va.—The Hanover Telephone Company has been incorporated with a capital stock of $5,000. The officers are: President, E. J. Flippo; treasurer, J. B. Bradley.

Lovington, Va.—Articles of incorporation have been filed for the Central Telephone Company. The capital stock is $5,000, and the officers are as follows: President, F. M. Horsley; vice-president, J. C. Clarkson; secretary, E. Carter.

Goodwins Ferry, Va.—The Spruce Run Mutual Telephone Company has been incorporated with a capital stock of $5,000. The officers are: President, L. A. Kessinger; secretary-treasurer, J. D. Scott; directors, F. B. Epling, O. L. Williams, B. E. Cook.

South Hill, Va.—The South Hill Telephone Company has been organized with the following officers: President, R. E. Yancey; vice-president, J. H. Wall; secretary and treasurer, N. G. Smith; capital stock $2,000 to $5,000.

Wakefield, Va.—The People's Telephone Company has been organized with the following officers: President, J. A. Brittle; vice-president, A. W. Holt; secretary-treasurer, N. B. Pond; Capital stock $4,000.

Lovington, Va.—The Rockfish Telephone Company has been incorporated with a capital stock of $5,000. The officers are: President, H. T. Harris; vice-president, J. C. Everett; secretary-treasurer, Thomas Boyce.

St. Thomas, Ont., Can.—The Southern Counties Telephone Association has been organized with the following officers: President, Dr. Doan Harrietsville; first vice-president, Dr. McEwan, Caradoc; second vice-president, Owen Westover, Malahide; secretary-treasurer, Dr. Crance, Wallacetown.

Summerland, B. C., Can.—The Lake Shore Telephone Company has been organized with a capital stock of $25,000.

Aberdeen, Sask., Can.—The Aberdeen Valley Rural Telephone Company has been organized.

Vancouver, Wash.—The Home Telephone Company has been incorporated with a capital stock of $150,000, by W. W. McVredie, H. C. Phillips, A. L. Miller, and J. D. Eaton.

Seattle, Wash.—The Seattle Home Telephone Company has been incorporated with a capital stock of 500,000. The incorporators are Samuel Hill, Hervey Liniley, and others.

Hunters, Wash.—The Southwest Telephone Company has been organized with the following officers: President, D. M. Glasgow; vice-president, A. F. Trunley; secretary, Herbert N. Newman; treasurer, E. G. Worthley.

Raymond, Wash.—Articles of incorporation have been filed for the Willapa Harbor Telephone Company with a capital stock of $30,000. The incorporators are: W. W. Cannon, C. S. Gilchrist, F. B. Hubbard, Centralia; J. L. Myers, South Bend; H. W. McPhail, Raymond.

Sumas, Wash.—The Farmers' Local Telephone Company of British Columbia has been organized.

Fairview, W. Va.—The Proctor and Peabody Telephone Company has been incorporated by E. R. Parsons, Albert Garner, and H. M. Wells of Proctor; C. U. Ramsey of Woodlands, and E. C. Yoho of Welcome; capital stock $5,000.

Center, Wis.—Articles of incorporation have been filed for the Apple Creek Telephone Company; capital stock $5,000. The incorporators are: F. W. Wickert, Fred Ziegler, Charles W. Schroeder.

Greenville, Wis.—The South Greenville Farmers' Telephone Company has been organized with the following officers: President, Louis Pringle; secretary, J. H. Schneider; treasurer, A. G. Mass.

Curran, Wis.—Articles of incorporation have been filed for the Curran Farmers' Telephone Company with a capital stock of $2,500. The incorporators are D. A. Stolts, W. M. Merrill, and others.

Madison, Wis.—Articles of incorporation have been filed with the secretary of state for the Ellington Farmers' Telephone Company of Outagamie county; capital stock $2,000. The incorporators are: John Wittlin, Wm. L. Lord, and others.

Retreat, Wis.—A new telephone company has been organized in this vicinity with the following officers: President, A. A. James; vice-president, C. A. Battles; secretary, J. T. Brudos; treasurer, Albert Olson.

Plover, Wis.—The Plover Telephone Company has been incorporated by W. L. Hartwell, F. L. Taylor, and S. B. Bell, with a capital stock of $1,050.

Forestville, Wis.—The Maplewood Western Telephone Company has been incorporated with a capital stock of $500, by Gustav Leege, Charles Hoeppner, and Henry Leege.

FINANCIAL ITEMS.

Clayton, Ill.—The Clayton Farmers' Telephone Company has increased its capital stock from $1,000 to $2,500.

Martinton, Ill.—The Local Telephone Company has increased its capital stock from $10,000 to $60,000.

Wallace, Idaho.—The North Idaho Telephone Company has increased its capital stock from $25,000 to $100,000.

Lawton, Iowa.—The Lawton Telephone Company has increased its capital stock from $3,000 to $9,000.

Westmoreland, Kan.—The Westmoreland Telephone Company has increased its capital stock to $8,000.

Hartwick, Mich.—The capital stock of the Osceola Rural Telephone Company has been increased from $3,000 to $6,000.

Glasgow, Ky.—The Glasgow Home Telephone Company has increased its capital stock from $10,000 to $25,000.

Pineville, Ky.—The capital stock of the New Pineville Telephone Company has been increased from $3,600 to $20,000.

NEW YORK, N. Y.—The Great Eastern Telephone Company has increased its capital stock from $1,000,000 to $50,000,000.

BUTLER, PA.—The People's Telephone Company has increased its capital stock from $100,000 to $200,000.

PATASKALA, OHIO.—The Pataskala Farmers' Telephone Company has increased its capital stock from $30,000 to $50,000.

MARFA, TEX.—The Marfa Telephone Company has increased its capital stock from $3,500 to $5,000.

REARDAN, WASH.—The West Crescent Telephone Company has increased its capital stock to $5,000.

HUBERTUS, WIS.—The Hubertus Telephone Company has increased its capital stock from $2,000 to $12,000.

EARL, ARK.—The capital stock of the Earl and Tyrone Telephone and Telegraph Company has been increased from $10,000 to $32,000.

RECTOR, ARK.—The Rector Co-operative Telephone Company has increased its capital stock from $5,000 to $15,000.

HIAWATHA, KANS.—The North East Kansas Telephone Company has increased its capital stock to $20,000.

PENDLETON, IND.—The Pendleton Telephone Company has increased its capital stock from $10,000 to $20,000.

RICHWOOD, MO.—The Richwood Telephone Company has increased its capital stock from $50,000 to $65,000.

WAYNE, MICH.—The stock of the People's Telephone Company has been increased from $6,000 to $20,000.

NORTON, N. D.—The Norton Telephone Company has increased its capital stock from $10,000 to $30,000.

BELLEFONTAINE, O.—The capital stock of the Logan County Farmers' Telephone Company has been increased from $5,000 to $15,000.

CONESTOGA, PA.—The Conestoga Telephone Company contemplates increasing its capital stock.

ALLENTOWN, WIS.—The Allentown-Kohlsville Telephone Company has increased its capital stock from $5,000 to $15,000.

SUSSEX, WIS.—The capital stock of the Lisbon Telephone Company has been increased from $720 to $5,000.

CUMBERLAND, WIS.—The McKinley Telephone Company has increased its capital stock from $500 to $10,000 and has changed its headquarters from McKinley to Cumberland.

DE PERE, WIS.—The capital stock of the Wayside Telephone Company has been increased to $10,000.

PEWAUKEE, WIS.—The Pewaukee and Sussex Telephone Company has increased its capital stock from $2,500 to $5,000.

NEW YORK, N. Y.—The Great Eastern Telephone Company has increased its capital stock from $1,000,000 to $50,000,000.

SPRINGFIELD, O.—The Springfield-New Carlisle Telephone Company has increased its capital stock from $20,000 to $40,000.

BUTLER, PA.—The People's Telephone Company has voted to increase its capital stock from $100,000 to $200,000.

FRANCHISES ASKED AND GRANTED.

SARATOGA, IND.—The Eastern Indiana Telephone Company has been granted a franchise to operate a telephone system in this place. The headquarters of the company is Winchester.

KINSLEY, KAN.—The Kinsley Automatic Telephone Company has been granted a 21-year franchise in this place.

COLUMBIA, LA.—The Home Telephone Company of Monroe has been granted a 25-year franchise here.

TRACY, MINN.—The common council has granted the Tri-State Telephone and Telegraph Company the right to maintain long distance telephone lines in this city.

NEOSHO, MO.—The Farmers' Union Telephone Company has been granted a franchise.

PLATT CITY, MO.—A franchise has been granted to the Farmers' Telephone Company of Platt County.

ERICK, OKLA.—The Walker Telephone Company has been granted a 21-year franchise in this place.

JACKSONVILLE, ORE.—A franchise has been granted the Citizens' Telephone Company, to construct and operate a system in this place and to connect with rural lines.

DANVILLE, PA.—The People's Ideal Telephone Company is seeking a franchise to construct and maintain a telephone system in this place.

EMPORIA, VA.—The Home Telephone and Telegraph Company of Henderson, N. C., has been granted a franchise to construct and operate a telephone system in this place. F. C. Toepleman, general manager of the company, will have charge of the work.

SPOKANE, WASH.—The Board of Commissioners has granted the Farmers' Telephone Company a twenty-five year franchise.

PATTERSON, W. VA.—The National Telephone Company of Wheeling has been granted a fifty-year franchise in this place.

MISCELLANEOUS.

WINNIPEG, MAN., CAN.—Plans have been completed by the telephone commissioners for the expenditure of $750,000, $250,000 of which will be spent in this city, $250,000 for rural lines and $250,000 on long distance lines and new exchanges throughout the province.

HAVANA, CUBA.—The Havana Telephone Company expects to establish a thorough underground system, which it is estimated will cost $1,500,000.

SAN DIEGO, CAL.—The Home Telephone Company will spend in the neighborhood of a quarter million dollars in extending and improving its system.

ATHENS, GA.—The Southern Bell Telephone Company contemplates the expenditure of $12,000 in the improvement and extension of its system in this city.

MARSHALLTOWN, IOWA.—A new automatic telephone system will be installed in this city at a cost of at least $200,000, work to begin June 15.

BOONE, IOWA.—The Boone County Telephone Company will erect a new exchange building at a cost of $125,000.

SOUTH BEND, IND.—The South Bend Home Telephone Company has authorized the expenditure of $30,000 in improvements and extensions.

DETROIT, MICH.—Plans have been perfected for doubling the present capacity of the Home Telephone Company's service in this city.

DAYTON, OHIO.—The Home Telephone Company will expend about $200,000 on improvements and extensions during the summer.

PORTLAND, ORE.—The Home Telephone and Telegraph Company will spend about $400,000 in improvements and extensions.

WENATCHEE, WASH.—The Farmers' Telephone and Telegraph Company will expend about $15,000 in the improvement of its local service.

SAN DIEGO, CAL.—The Pacific Telephone and Telegraph Company will make extensive improvements in its plant in this city.

CARTHAGE, ARK.—The Grand and Dallas County Telephone Company is planning to construct additional lines.

MORRILTON, ARK.—The Home Telephone Company will install a new switchboard and make other improvements.

ELKHART, IND.—The Home Telephone Company has made plans for the erection of an exchange and also contemplates overhauling its system and extending its lines.

MECCA, CAL.—The Coachella Valley Telephone and Telegraph Company will construct additional lines.

CANTON, ILL.—The Canton Home Telephone Company will construct a line from Canton to Macomb.

DECATUR, ILL.—The Home Telephone Company will increase its switchboard capacity.

ELLIOTT, ILL.—The Dix Telephone Company contemplates the construction of a new exchange.

PHELPS, ILL.—The Berwick Farmers' Telephone Company will extend its lines in this vicinity.

EVANSVILLE, IND.—The Blue Grass Telephone Company will construct lines through Vanderburg and Warrick counties, and install exchanges.

INDIANAPOLIS, IND.—The Indianapolis Telephone Company will install an exchange at Irvington.

MICHIGANTOWN, IND.—The Michigantown Co-operative Telephone will extend and improve its lines and also increase its switchboard capacity.

BLUE RAPIDS, KANS—The Bigelow Mutual Telephone Company will make a number of improvements and extensions.

JUNCTION CITY, KANS.—The Wareham-Dewey Telephone Company will erect a new exchange building, in which will be installed a new switchboard.

QUINTER, KANS.—The Quinter Telephone Company will install a new switchboard at Collyer and will also increase its switchboard capacity in this place.

WESTMORELAND, KANS.—The Westmoreland Telephone Company has purchased the telephone systems at Oldburg, Garrison and Stockdale. A line will be built to Oldburg and an exchange installed there.

HAZARD, KY.—The Perry County Telephone Company will build additional lines and will install a new switchboard in the local exchange.

WHITESBURG, KY.—The Whitesburg Telephone Company will make a number of improvements and extensions.

WILMORE, KY.—The Jessamine Home Telephone Company will rebuild its system in this place and will extend its lines into the country.

SHREVEPORT, LA.—The Cumberland Telephone Company will erect a new exchange building in this city, which will be furnished with all modern equipments.

BREAUX BRIDGE, LA.—The Breaux Bridge-St. Martin Telephone Company will construct additional lines.

GLENN, MICH.—The Mutual Telephone Company has changed its name to the Western Allegan County Farmers' Mutual Telephone Company.

MARQUETTE, MICH.—The Marquette County Telephone Company will extend its lines.

NORTH MANCHESTER, IND.—The Eel River Telephone Company will extend its lines.

NEW RICHMOND, IND.—The New Richmond Co-operative Telephone Company's plant has been purchased by A. L. Clark, who will improve and extend it.

NEWKIRK, IA.—The Case Telephone Company will install a new switchboard in its exchange at this place.

CEDAR RAPIDS, IA.—The Cedar Rapids and Marion Telephone Company will make many improvements in its different exchanges and an all cable system will be installed at Mt. Vernon.

CORNING, IA.—The Corning Telephone Company will rebuild its system.

COUNCIL BLUFFS, IA.—The Mills County Telephone Company has been purchased by the Independent Telephone Company of this city.

GALESBURG, ILL.—The Union Telephone Company of this place is planning to make extensive improvements on all parts of its system.

WINFIELD, KANS.—The manager of the Missouri and Kansas Telephone Company announces that the telephone system in this city will be reconstructed.

NICKERSON, KANS.—The Nickerson Telephone Company will erect a new building, install a new switchboard and otherwise improve its system.

WILLOW RIVER, MINN.—The Pine County Telephone Company will extend its lines in all directions.

ELMORE, MINN.—The Rome and Elmore Telephone Company will rebuild its line.

FRAZEE, MINN.—The local telephone system has been purchased by the Turner and McNairy Telephone Company.

GARDEN VALLEY, MINN.—The Garden Valley Telephone Company will construct several new lines.

ST. VINCENT, MINN.—The Northern Telephone Company will make a number of extensions.

MERIDIAN, MISS.—The Home Telephone Company will construct long distance lines.

HOLDEN, MO.—The Holden and Pittsville Telephone Company will rebuild its lines.

MILO MO.—The Milo Telephone Company will make improvements, including the installation of a new switchboard.

HERKIMER, N. Y.—C. H. Poole of Utica recently purchased the property of the Herkimer County Telephone Company, at referee's sale, for $16,000.

HELENA, MONT.—The Rocky Mountain Bell Telephone Company has arranged for extensive improvements at Helena and in other parts of Montana during the year.

MALONE, N. Y.—The Adirondack Home Telephone Company will make extensions and improvements in its system.

DAYTON, O.—The Home Telephone Company will expend about $200,000 in extending its system, which will include five new sub-stations.

OTTAWA, O.—The Putnam Telephone Company will install an entire new plant.

CLARKSVILLE, TENN.—The property and franchise of the Home Telephone Company, sold under foreclosure by special master, E. B. Denison, was bid in by Dancey Fort, trustee for the bondholders, for $44,650.

ALPINE, TEX.—The Alpine telephone system has been purchased by A. W. Mills, who announces that he will install automatic apparatus and also extend the system.

WACO, TEXAS.—The Texas Telephone Company has been purchased by George Rotan and I. B. Earle, who will improve and extend the system.

HOUSTON, TEX.—The Citizens' Telephone Company announces that $1,000,000 will be spent in improving the old properties, while the Southwestern company makes the announcement that more than $150,000 will be spent in improvements.

PORT ARTHUR, TEX.—The South Texas Telephone Company will install a new common battery system.

SHERMAN, WASH.—The Sherman Telephone Company will rebuild its lines.

FORT ATKINSON, WIS.—A. W. Larson of Deerfield has purchased the local telephone system and will make many improvements.

The "Chloride Accumulator" owes its popularity for telephone service to the following facts:

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In an effort to develop a remedy for the conditions of incivility and discourtesy which are so common betweeen telephone users, and which tends to bring adverse criticism upon all telephone service, **Telephone Engineer** offers to its readers a series of four cash prizes for the four best short articles or essays on telephone etiquette. The conditions governing the competition are as follows. The cash prices offered are:

First prize - -	$50.00
Second prize - -	$25.00
Third prize - -	$15.00
Fourth prize - -	$10.00

Articles shall not exceed two thousand words in length, and may be as short as desired.

Manuscripts should be typewritten, double-spaced and sent folded, not rolled.

All manuscripts or inquiries should be addressed to "Contest Editor, Telephone Engineer, Monadnock Building, Chicago, Ill."

Receipts of manuscripts cannot be acknowledged, nor will unavailable articles be returned.

The contest will be closed September 1, 1909, and prize winners will be announced in the October number of **Telephone Engineer**, the prize winning articles being printed as soon thereafter as possible.

Articles will be read and prizes awarded by a board of judges, whose personnel will be announced in **Telephone Engineer.**

Telephone Engineer reserves the right to buy, at its regular space rates, such articles as are deemed desirable, although not prize winners.

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